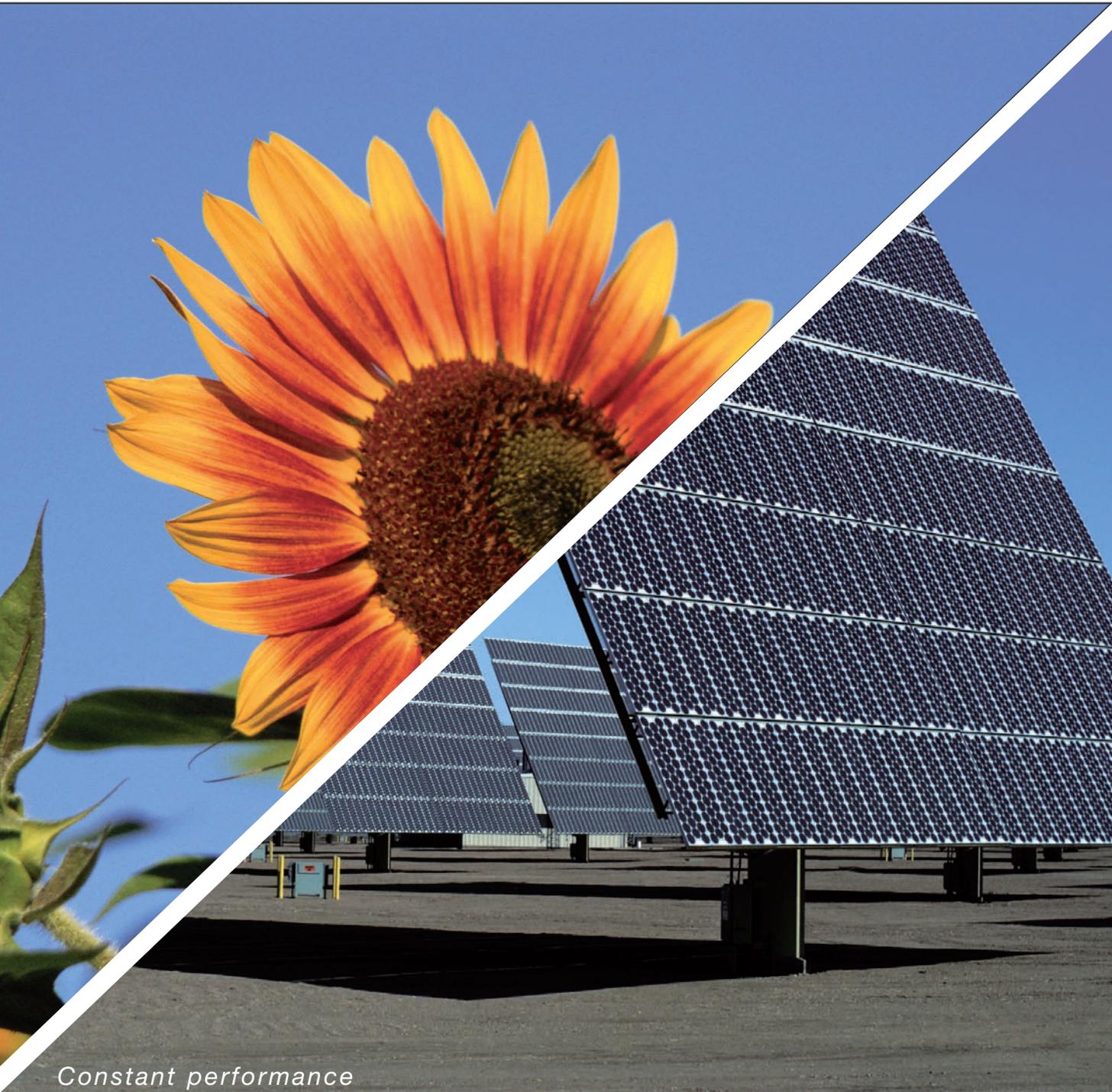


Photovoltaic Catalogue

INDUSTRIAL SWITCHING AND PROTECTION SYSTEMS **2009**



Constant performance



Welcome to your SOCOMEC catalogue dedicated to **photovoltaic applications**. The products are classified by application for an ultra-quick access. Let us guide you in the discovery of the extent of our solutions
Enjoy your visit!



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A leading company at your service

↪ The enterprise at your disposal

We are very committed to giving you the best response to your expectations. This is why we have a fully integrated sales network that really understands your industrial environment. Relevant departments work closely with you, depending on the project. With SOCOMEC, our specialists are always close to hand should you need them.

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We offer the widest range of switching and protection systems: thanks to customised solutions adapted from standard products, our range is able to cover a wide spectrum of applications. Concentrating on modular design and a full range of easy-to-mount accessories also means that you benefit from many complementary and cost-effective functions.

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JANUS 2008
DE L'INDUSTRIE

↪ JANUS award 2008 for industry

The latest example: The range of S-type handles has been awarded with the JANUS 2008 for industry. Awarded by the French Institute of Design, under the sponsorship of the Ministry of Foreign Trade, this prestigious prize rewards a range much appreciated by our clients.



SITE 117 A



SITE 118 A



SITE 041 A

↪ Delivering on time

Real-time order and logistics management, which we carry out in close collaboration with our carriers, is our guarantee of a prompt and efficient delivery service.

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SOCOME C also claims its own style: Personal commitment at your side, friendliness, solidarity in a common project, an adequate response to each of your requirements, these are the convictions of our teams of women and men.

↪ Integrated production and shorter lead-times

As an independent manufacturer, SOCOMEC controls its strategic design and manufacturing processes and makes full use of the latest advances as far as flexibility is concerned.

Our integrated production organised in autonomous working groups offers customers guaranteed manufacturing quality with full control over delivery times.

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An integrated laboratory approved by ASEFA-LOVAG, a large number of approvals and certifications guaranteeing the compliance of our devices with the international standards, an acknowledged and proven quality, universality and adaptability to your specific configuration all guarantee your complete satisfaction.



CORPO 173 A

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⇨ Pierre SIAT electrical test station

Since 1965, the SOCOMEC production site has also included a test facility. This laboratory is a member of ASEFA (the French Association of Electrical Appliance Test Facilities) and is accredited by COFRAC, the French accreditation committee.

Today, SOCOMEC puts its know-how at your disposal and offers to carry out your own tests within this specialist facility.

Our team of professionals will carry out all the tests of compliance with French, European or world standards with you.

Types of tests: Dielectric tests, thermal tests, mechanical endurance tests, system tests, climatic tests, short-circuit tests.



CORPO 183 A

⇨ Approvals and certifications

Upon request, our laboratory puts approval certifications and declarations of conformity or performance at your disposal.

SOCOMEC
Innovative Power Solutions

Testing laboratory
rue de Westhouse
B.P. 10
67200 BENFELD
Tel. (33) 03 88 57 41 41
Fax (33) 03 88 57 42 20

DECLARATION DE PERFORMANCE N° DP 10110 CPR
Suivant spécifications :
CEI 60947-3 (2001-05)

MATERIEL ESSAYE
Designation : Interrupteur-sectionneur
Type : SIRCO M DC 40A
Référence : 22DC3004 + 22DC1004
Calibre : 40A
Constructeur : SOCOMEC S.A. 67200 BENFELD FRANCE

Caractéristiques assignées :
The above-mentioned product satisfies the following characteristics:

| | | | | | |
|------------------------------------|--------|--------|--------|--------|--------|
| * Rated current (A) | 40 | 40 | 40 | 40 | 40 |
| * Rated operational voltage DC (V) | 200 V | 440 V | 500 V | 600 V | 800 V |
| * Utilisation category | DC-21B | DC-21B | DC-21B | DC-21B | DC-21B |
| * Rated operational current (A) | 32A | 32A | 32A | 25A | 25A |
| * Number of poles | 3 | 4 | 4 | 6 | 8 |

Pièces Jointes : /
Date : 26 Août 2008
Le Responsable

Daniel REY
Daniel REY

Dominique Mathiak
Dominique Mathiak

La Responsable Early Certification et Conformité
Pierre SIAT
67200 BENFELD cedex - FRANCE

SOCOMEC S.A. au capital de 11 400 000 € - s.r.l. - siège social : 14, rue de Westhouse - 67200 Benfeld France - tel. 03 88 57 41 41 - télécopie 03 88 57 73 73 - Site Web : www.socomec.fr
N°D 03 010585 Arrivage : 10 ans par SCR-LAB

⇨ Metrology

Can you guarantee the quality of the measurements that you take during the development, production or testing of your products?

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APPLI 079 A

⇨ Services & Technical Assistance : Assuring your peace of mind

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Customised features

A broad range of features tailored to respond to the particular requirements and limitations of your electrical installation, and to help you deal with specific operational demands.

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Please do not hesitate to contact your SOCOMEC agency to discuss a service package tailored to your requirements.



APPLI 265 A

General features

History

Origins of market

Solar energy only needs to be captured and has always been a source of natural alternative and renewable energy. Its two forms, thermal and photovoltaic, allow to directly generate heat or electricity respectively. The former has the advantage of a simple and inexpensive installation, the latter easily transports energy to the place of consumption.

Apart from the first specific experiments in the 70s, the photovoltaic market started in the 80s through isolated residential and rural installations. From the 90s, the principle of electrical connection of grid-connected photovoltaic installations has been increasingly used.

The photovoltaic market

Since 1995, countries like Germany and Japan have been forerunners in this market and have favoured the implementation of photovoltaic installations at all levels worldwide.

In 2008, the world production of photovoltaic energy was approximately 15 000 MW.

Despite the evolution of the energy efficiency of photovoltaic installations, and in particular photosensitive panels, the key to this market remains the catchment surface available to channel this energy free of charge.

Main applications



site_408_a

Residential

Electric installations up to approximately 5 kW are affected by this application. It is composed of panels installed on house roofs which are mainly used for electric equipment. State aid in the form of tax deductions has strongly contributed to the development of this market.



© SMA solar technology 1135

Building (BIPV)

Electric installations up to approximately 250 kW are affected by this application. It is composed of panels installed on terraces, skylights, glass sections or on building façades. The designers make a compromise between optimisation of energy production and maximum reduction of installation costs.



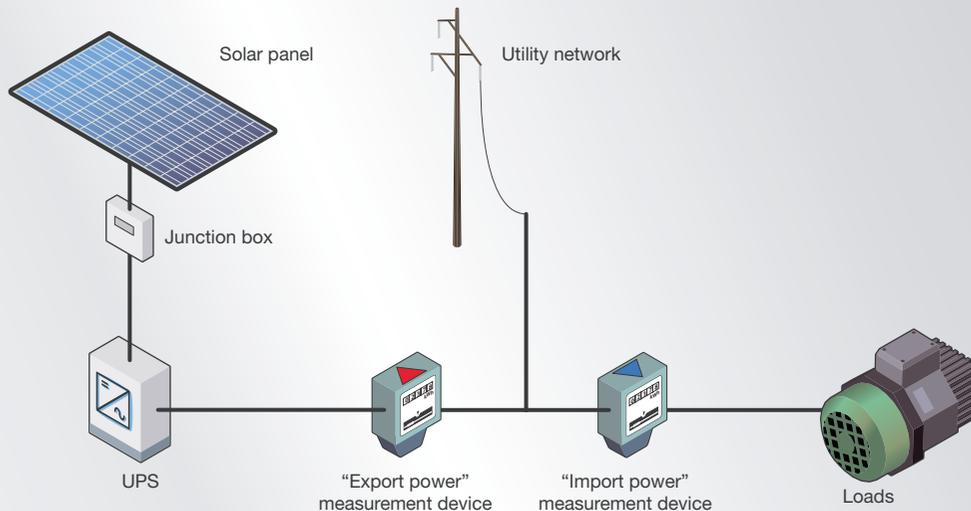
site_317_a

Solar parks

Electrical installations of several MW are affected by this application destined for the resale of the produced energy to distributors (EDF...). It is composed of solar panels installed in fields of several acres. E.g., for an installation of 8 MW, a field of approximately 16 acres will be necessary.

⇒ Principle diagram

The principle consists in capturing the maximum solar radiation and converting this energy in the most cost-effective way possible.



solar_008_a_gb

⇒ Catchment

The production of photovoltaic energy is directly related to:

- geographical location (variation of sunlight),
- the catchment surface,
- the season and time of the day.

Via the panel orientation at 45°, solar energy can produce a power of 1000 Watts/m² surface.

This energy is captured by photovoltaic modules which present a yield between 3 and 25% according to the technology (mono-crystalline, multi-crystalline or amorphous silicon).

For instance, a 1 m² solar panel with a 14% yield generates a peak power of 140 Wp.

⇒ Power generation

These modules generate a voltage of 12 or 24 volts and currents proportional to the module's surface. They are associated in series to increase the voltage and the maximum current up to the exploitation level required according to the application (see following paragraph). The created voltage is rectified in order to reach the subsequent levels:

- Approximately 300 to 600 VDC for low-power installations,
- Approximately 600 to 900 VDC for medium-power installations,

⇒ Energy conversion

The direct current is converted by an inverter (DC/AC conversion) into monophasic or 3-phase alternate current for local use or for reinjection into the electric transmission grid. This conversion guarantees a yield between 90 and 95%, according to the inverter brand and type.

⇒ Energy conversion

At its reinjection point, an energy meter allows the measurement of the energy in the grid.

Example of a domestic installation:

- received power: 1000 W/m²,
- yield: 14%,
- overall surface: - 20 m².
- received power: 2.8 kWp.

The mean daily production will therefore be between 5 and 8 kWh.

⇒ Energy balance and depreciation

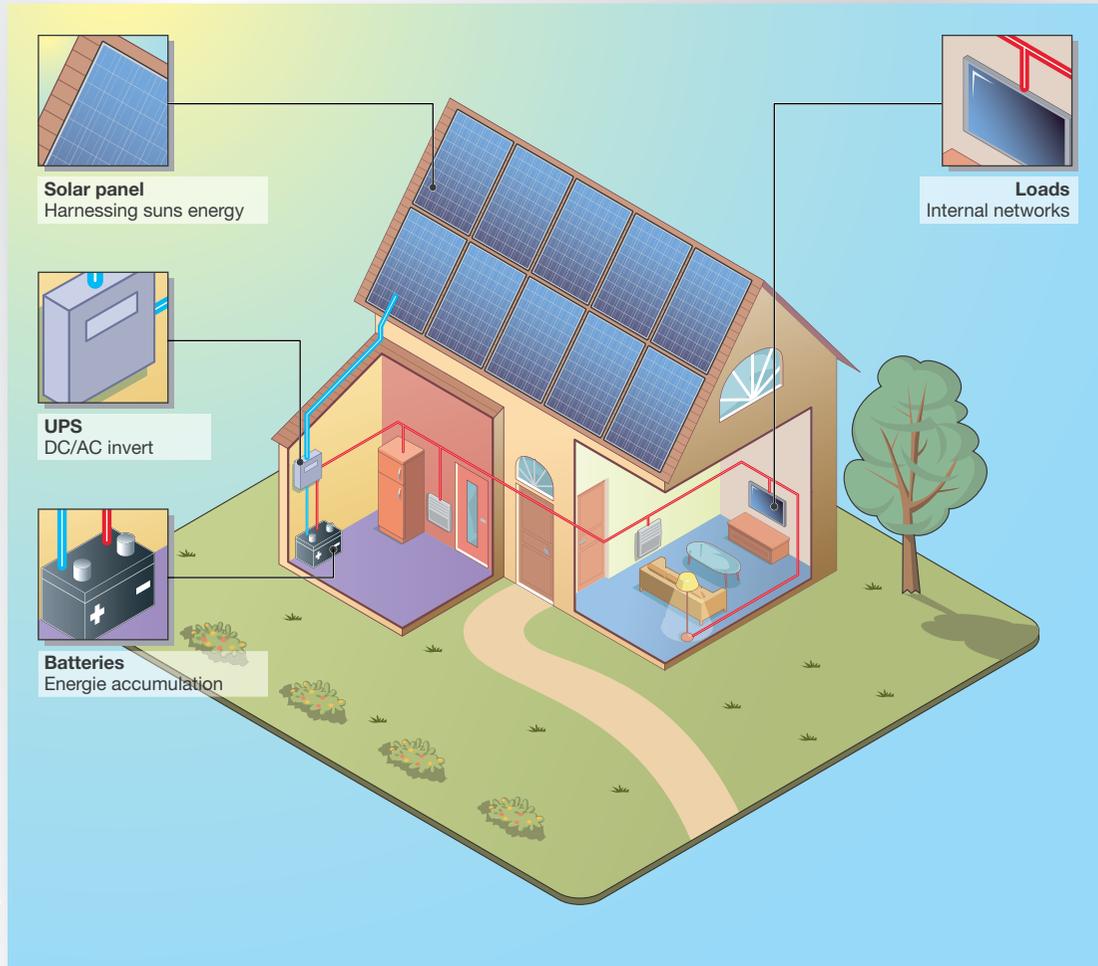
It is quite clear that the production of the entire installation essentially depends on the panel energy efficiency and on their surface.

On the other hand, the depreciation rate will mainly depend on the price and life duration of the photovoltaic panels.

Type of installation

Photovoltaic applications apply to 3 types of installation.

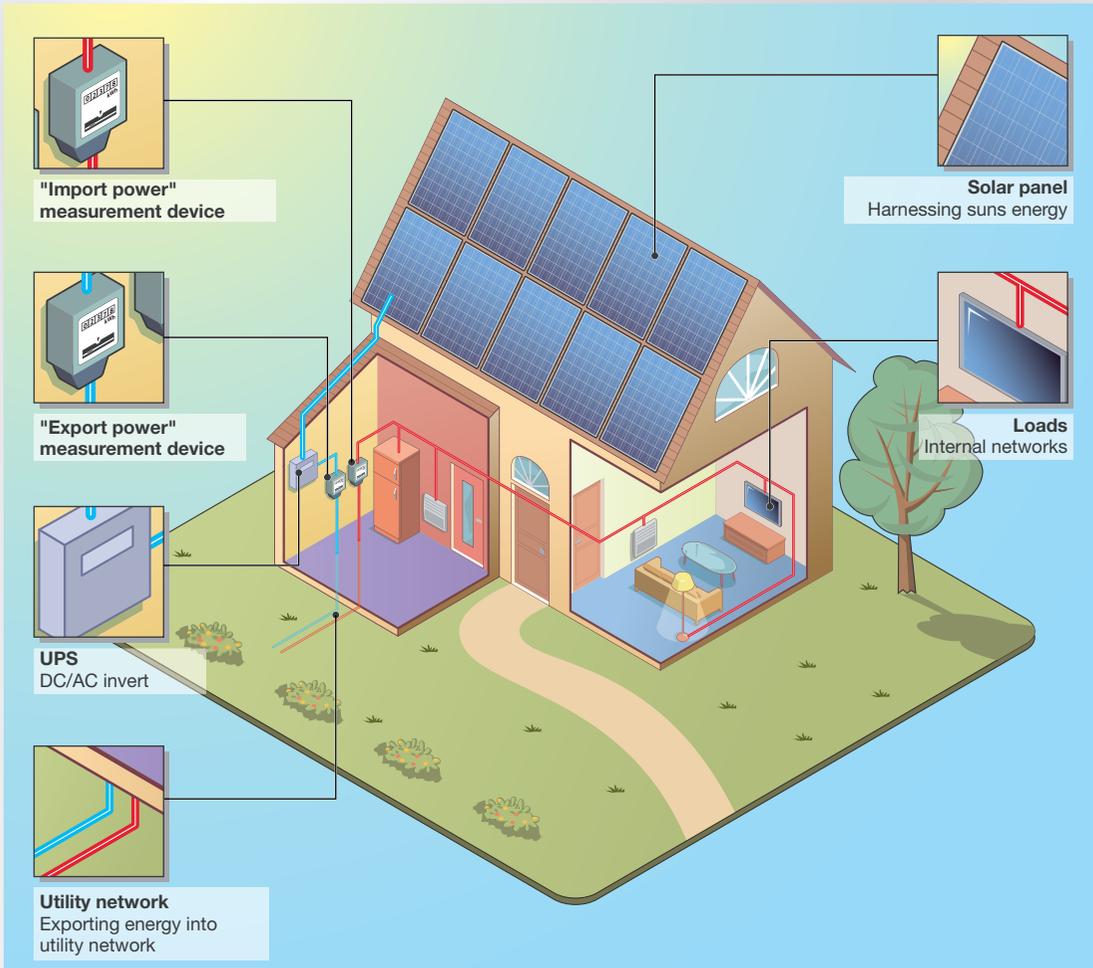
➔ Independent isolated installation



This type of installation is used for local energy supply to houses, farms, havens and buildings. The panels supply direct current with a voltage below 600 VDC for residential use and over 600 VDC for buildings and solar parks. This direct current is transformed by an inverter into alternate current adjusted at 230 volts or 400 volts and 50Hz and redirected to accumulation batteries.

The energy supply is made directly from the inverter and the surplus will be stored in the batteries with an autonomy from 6 to 8 consecutive days. A cabinet ensures the safety and the control of the system.

⇒ Grid-connected installations

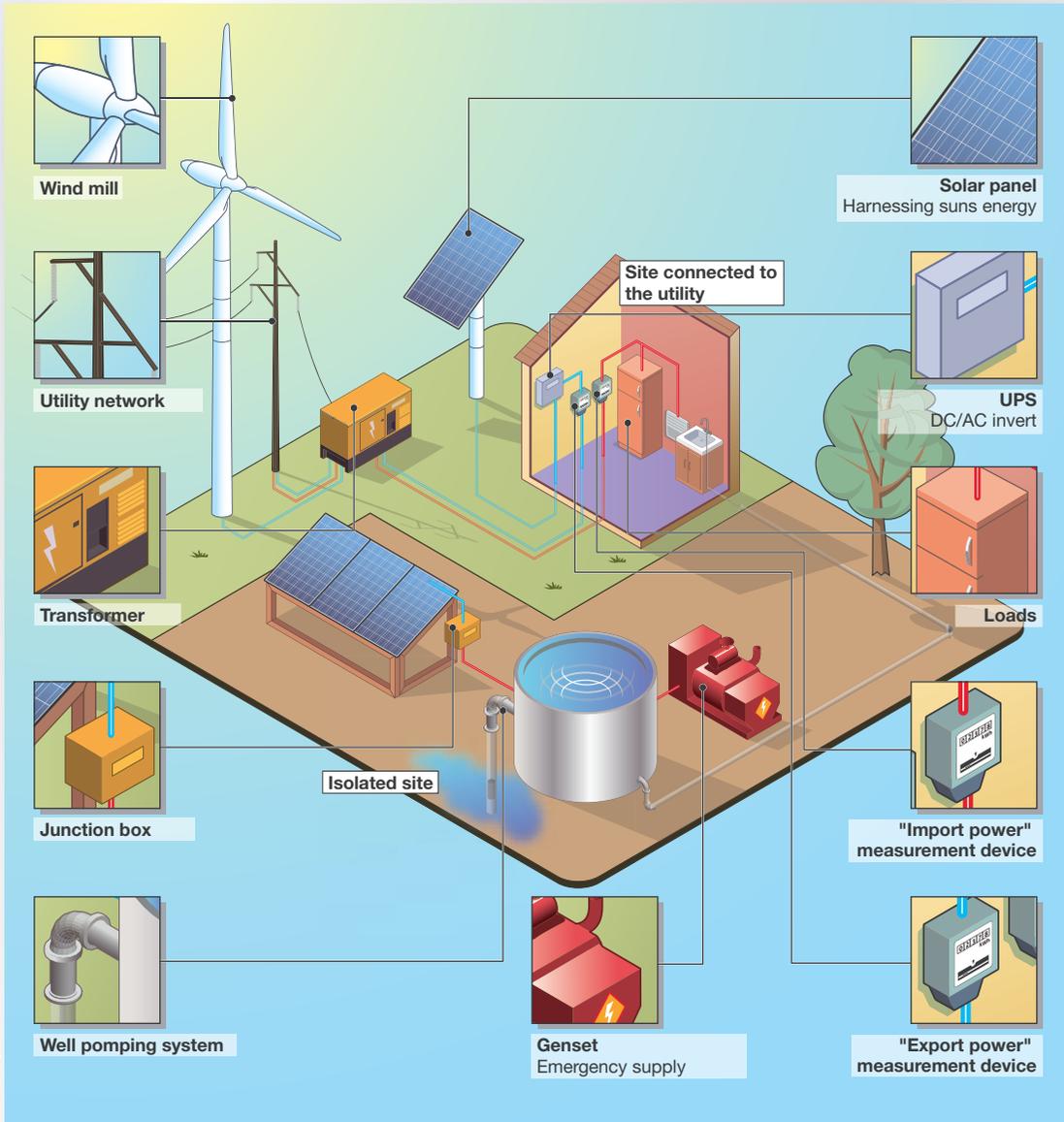


This type of installation is used for the local production of electric energy. It is applied to sites for residential and commercial use and to solar parks. Anyone can become a producer of renewable energy by injecting all or part of the locally produced energy into the public distribution grid. The energy suppliers (EDF...) systematically

purchase this energy at preferential rates defined in the regulatory framework established by the Government. The energy counting is done by 2 different meters for measuring the energy production and consumption respectively.

Type of installation

➔ Mixed installation



This type of installation is used for the local supply and production of electric energy. It is applied to sites for residential use and buildings and to solar parks. The purpose is to use the principles of a grid-connected installation (see below) completing it with another

energy production, such as wind energy, heat pumps or generators. This solution allows the creation of an installation that does not depend exclusively on sunlight.

⇒ Normative aspects

Low-voltage photovoltaic installations are submitted to the standards for low voltage electrical installations of each country:

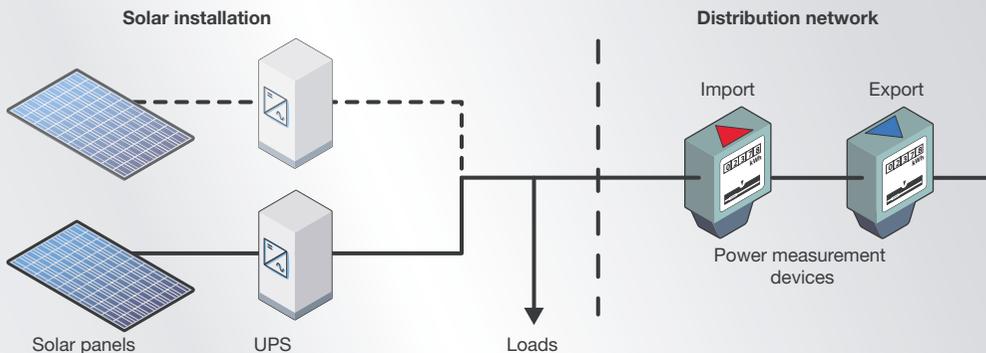
- IEC 60364 abroad,
- NF-C 15100 in France.

These standards describe the nature of the protection devices in order to ensure the safety, the choice and the implementation of the electric material.

Specific documents and chapters are directly applicable to the PV installations:

- UTE 15-712 (February 2008):
Practical guide to photovoltaic installations,
- IEC 60364-7-712 (2002-5 edition):
Buildings electrical installations - Rules for special locations - Solar photovoltaic power supplies (PV),
- ADEME guide (June 2006):
Grid-connected photovoltaic generators.

⇒ Limits of application



⇒ Earthing diagram

AC side, TNS-type earthing diagram
DC side, IT-type earthing diagram
(if the inverter presents a galvanic insulation).

⇒ Earthing of masses

The masses of the various devices (PV panels, inverters, other devices) must be connected via equipotential both at DC and AC.
The earthing must be carried out in a single point.

⇒ Protection

We remind you that the voltage levels implemented in PV installations go from 300 to 900 VDC and impose taking potential dangers into account.

Protections to be implemented

| Type of protection | DC side | SOCOMEK recommends |
|------------------------|---|---|
| Direct contacts | Reinforced insulation | - |
| Indirect contacts | Double insulation Classe II materials or equivalent insulation | Coded impulse Permanent insulation controller |
| Overcharge | If the cable current rate > 1.25 x I _{sc} stc | gR fuses |
| Transitory overvoltage | Type 2 lightning arrester | Type 2 DC lightning arrester |
| Section | Disconnecting switch | load break switches |
| Type of protection | AC side | SOCOMEK recommends |
| Direct contacts | Insulation | - |
| Indirect contacts | Differential device with automatic cut-off switch | Type A or type B differential relay (only if there is no galvanic insulation between the DC and the AC side of the inverter) |
| Over-current | Over-current protection | gG fuses - gR fuses |
| Transitory overvoltage | Type 2 lightning arrester | Type 1 or type 2 mono AC lightning arrester |
| Section | Disconnecting switch | load break switches |

Residential



site_048_a

Installations

Single houses or residential complexes

Residential installations are composed of photovoltaic panels with a surface of a few square metres up to around twenty square metres. The panels are installed on the roofs of single houses or of small residential complexes.

⇒ These installations are submitted to the following conditions

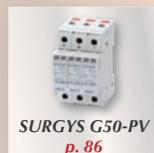
- **Catchment surface:** from 2 to 20 m²
- **Operating voltage:** from 250 to 500 VDC
- **Peak power:** from 2 to 5 kWc
- **Isc current:** from 2 to 20 A DC
- **Output voltage:** 230 VAC mono

The essential

Manual load break switches



Surge protection device



⇒ Need a suggestion?

We will help you find the best solution for your application.

⇒ **A special requirement?** SOCOMEC makes specific products. Please feel free to consult us.

Residential installation



➔ The installation can be composed of the following units

Direct current side (DC)

- Photovoltaic panels
- load break switch
- DC surge protection

Alternate current side (AC)

- Differential protection device
- load break switches
- Energy metering device

The PV installation will have a class II insulation. All the equipment frames will be connected to earth in a single point via protection conductors.





⇒ Residential diagram

The PV unit is composed of panels which releases the direct current to an inverter

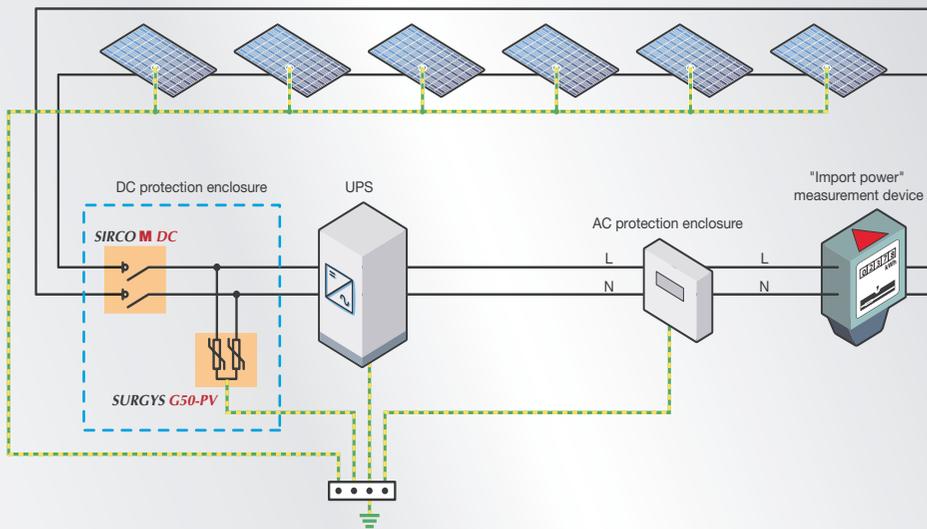
Upstream the latter is installed a DC protection kit including:

- a **SIRCO M DC** load break switch allowing to stop the PV system for maintenance, for example.
- A type 2 **SURGYS G50-500** surge protection device allowing to protect the inverter from transitory overvoltage due to lightning. A lightning rod is installed on the house in case of a high level of lightning strike (Nk>25).

Downstream the inverter is installed an AC protection kit requiring a high-sensitivity differential protection device as well as a disconnecting device.

An energy meter is installed downstream the AC protection kit in order to record the energy reinjected into the grid.

According to the geographical location, a system with a power of 3 kWc can produce from 7 to 10 kWh per day.



solair_010_a_gp



Building (BIPV)



© SMA solar technology AG

Installations Buildings (BIPV)

PV installations for commercial use are composed of PV panels from tens to hundreds square metres. These panels can be installed on roofs, terraces, on the façade of supermarkets, industries, public buildings, etc.

⇒ These installations are submitted to the following conditions

- **Catchment surface:** from 10 to 600 m²
- **Operating voltage:** from 400 to 900 VDC
- **Peak power:** from 5 to 250 kWc
- **Isc current:** up to 100 A DC
- **Grid injection voltage:** 230 VAC monophase or 230/400 VAC 3-phase

The same aids as for residential installations apply for installations, whose PV elements are integrative part of the building. On the other hand, an inclination of 45° of the PV panels is necessary in order to optimise their energy efficiency. This geometric limitation does not allow a forced integration of the panels in the building, therefore, they are not necessarily applicable for subsidy.

Hence it is necessary to find a compromise between obtaining the subsidy and energy efficiency by:

- vertically integrating the panels in the façade of the building to the detriment of energy efficiency,
- Disposing the panels at 45° on the building roof to the detriment of obtaining the integration subsidy,
- using flexible materials (amorphous type integrated in the roof sealing system) with weaker energy efficiency (7% against 14% for polycrystalline panels).

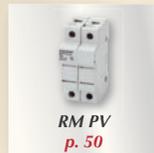
The essential

Switches

Disconnecting switch



Disconnecting switch fuses



Fuse protection



Energy metering device



Surge protection device



⇒ **Need a suggestion?**

We will help you find the best solution for your application.

⇒ **A special requirement?**

SOCOMEK makes specific products. Please feel free to consult us.



How to choose your installation

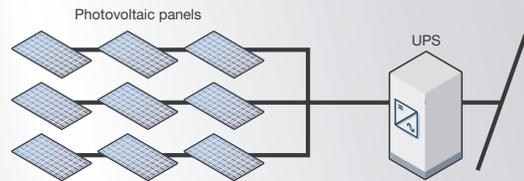


There are several types of installation structures for both the DC and the AC sides, which evolve according to the technology used in the AC-DC converters.

Moreover, we will present only a few relatively classic structures.

➔ Centralised inverter architecture

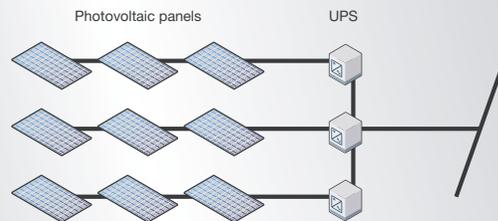
Several lines of modules are connected either directly (if the inverter allows it) or via a connection box to a centralised inverter.



solair_015_a_gp

➔ String inverter architecture

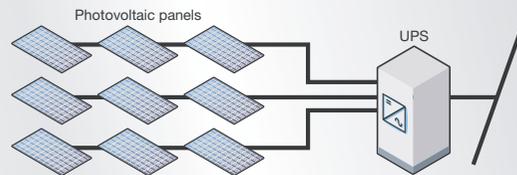
Each line of modules is connected to an inverter. The inverters are connected in parallel on the grid.



solair_016_a_gp

➔ Multi-string inverter architecture

Several lines of modules are directly connected to a centralised inverter.



solair_017_a_gp

➔ The installation can be composed of the following units

Direct current side (DC)

- Photovoltaic panels
- load break switch or inverter on each string
- load break switch at the inverter inlet
- DC surge protector

Alternate current side (AC)

- Differential protection device
- load break switch + fuse
- Energy metering device

The PV installation will have a class II insulation. All the equipment frames will be connected to earth in a single point via protection conductors.

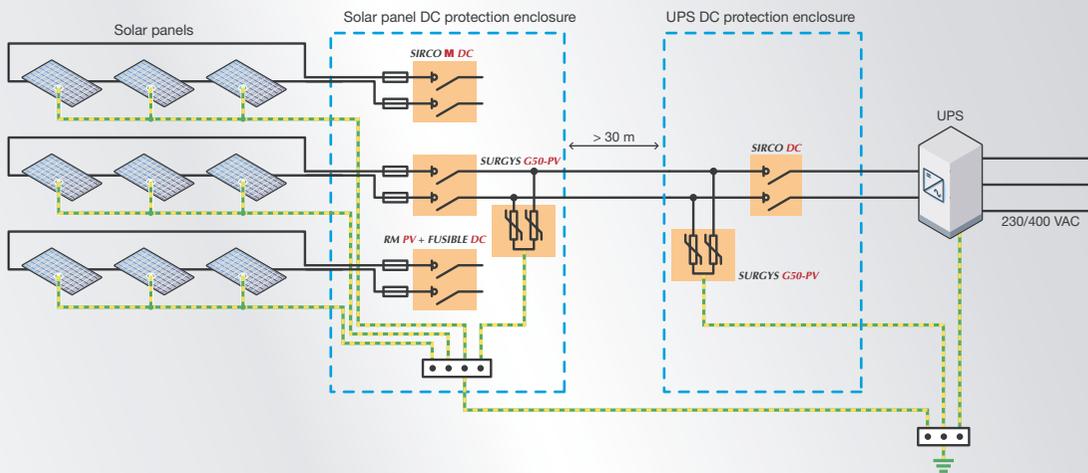
Buildings (BIPV) diagrams

Direct current side (DC)

The DC protection kit has the same function as in the installations for residential use.

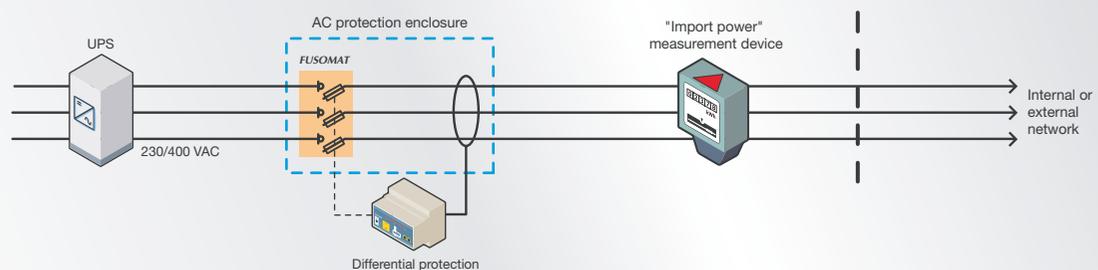
Any maintenance operation on a string must be carried out without interrupting the energy production. As such, each string can be cut independantly thanks to a **SIRCO DC** switch installed in the junction box. On the other hand, each string is protected by a DC fuse which allows protecting the interested string in case of short-circuit (in case the total number of strings is higher or equal to 4).

The panels can be protected by a **SURGY S G50-PV** surge protector if the junction boxes are at a distance of over 30 metres from the inverter.

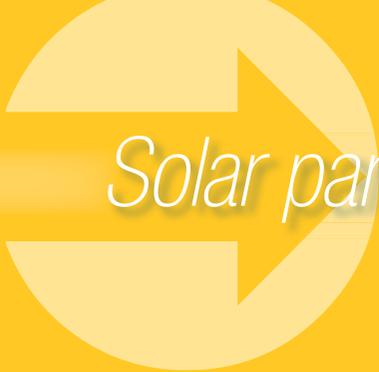


solar_011_a_gp

Alternate current side (AC)



solar_012_b_gp



Solar parks



sh_317_3

Installations

Solar fields



Solar fields are composed of PV panels of several thousands square metres. These installations allow generating various powers and need a large rural site away from big buildings. These plants are remarkable not only for their power level, but also for the mechanisms that, in some plants, allow orienting the catchment surface according to the season and sunlight conditions in order to optimise the power level injected in the grid.

➤ **These installations are submitted to the following conditions**

- **Catchment surface:** from hundreds to thousands m²
- **Operating voltage:** from 400 to 900 VDC
- **Peak power:** tens of MWc
- **Grid injection voltage:** 400 or 690 VAC for reinjection into the medium HTA voltage grid

Solar fields are composed of a large number of interconnected strings, as well as various inverters installed in parallel in order to generate a power of several MWc. These fields can have various subfields that have solar orientation from east to west in order to optimise the global energy efficiency throughout the day. Some fields are also equipped with solar tracking in order to monitor the solar panel position.

These vast solar installations require a protection study in order to determine with precision the various types of protection devices, as well as their installation location.

The essential

Switches disconnecting switch



SIRCO DC
p. 34

Switches fuses



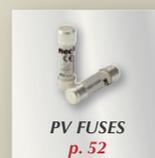
FUSERBLOC DC
p. 44

Disconnecting switch fuses



RM PV
p. 50

Fuse protection



PV FUSES
p. 52

Energy management



DIRIS A40
p. 72

Protection differential



RESYS M40
p. 80

Surge protection device



SURGYS G50-PV
p. 86



➤ **SERVICES & TECHNICAL ASSISTANCE:**

take advantage of our expertise!

We will help you design your protection solution, guaranteeing a perfect integration of the products in your environment.

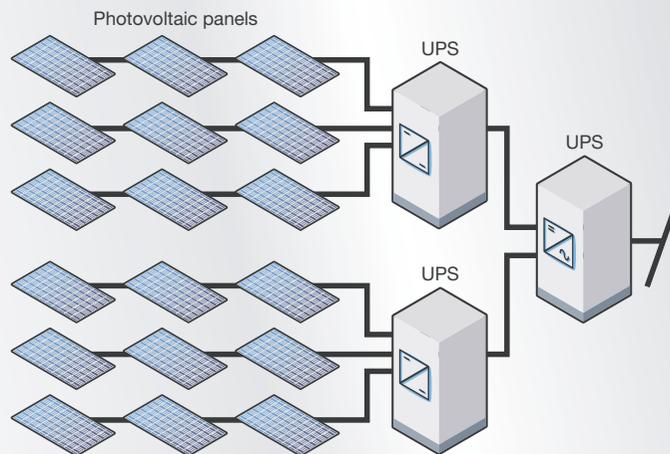
For further information, please contact your SOCOMEC agency.

Solar parks



There are several types of installation structures on the DC side. The energy generation surfaces are subdivided into subassemblies also composed of a multi-string structure. Each subassembly powers one or more medium-power multi-string inverters (from hundreds kWc to several MWc)

➔ Example of architecture



solar_018_a.jpg

➔ The installation can be composed of the following units

Direct current (DC) side

As for the surface (length of conductors) and the complexity of the solar field, it is important to provide for various mechanisms in order to easily:

- protect the various solar panels from overvoltage due to weather,
- isolate one or more panels to detect any insulation fault at the DC grid,
- connect a string to earth or interrupt it for carrying out maintenance operations on the panels or on the conductors,
- implement a Insulation Monitoring Device (IMD) external to the inverter.

Alternate current side (AC)

- Differential protection device
- load break switch + fuse
- Energy metering device

The PV installation will have a class II insulation. All the equipment frames will be connected to earth in a single point common to the AC and DC sides via protection conductors.

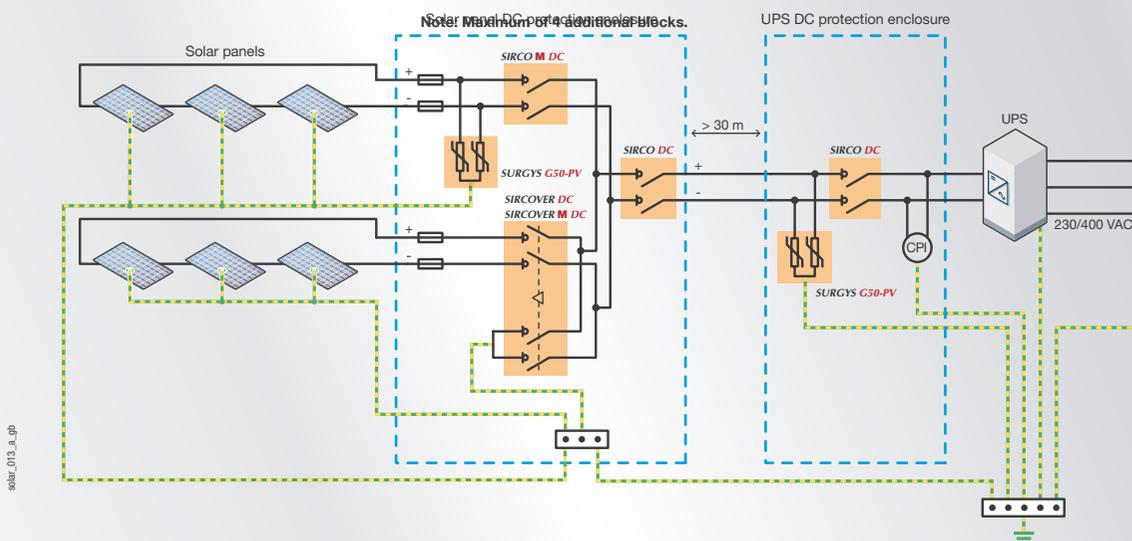
Industrial diagram

Direct current side (DC)

This DC side is similar to a building installation, only with a higher degree of complexity since the installation requires supplementary functions. Thus, the higher frequency of maintenance operations require supplementary precautions aiming, for example, at short-circuiting and earthing a string.

It is necessary to install a "Permanent Insulation Controller" function compatible with extension of the DC grid and, therefore, of its leakage capacity. This function is essential to show any loss of insulation in the PV unit. On the other hand, portable fault detection systems allow a rapid detection of any fault on the strings (degradation of a conductor, a surge at the end of its life, etc.).

This function is fundamental to quickly detect any earthing fault and rapidly correct it.

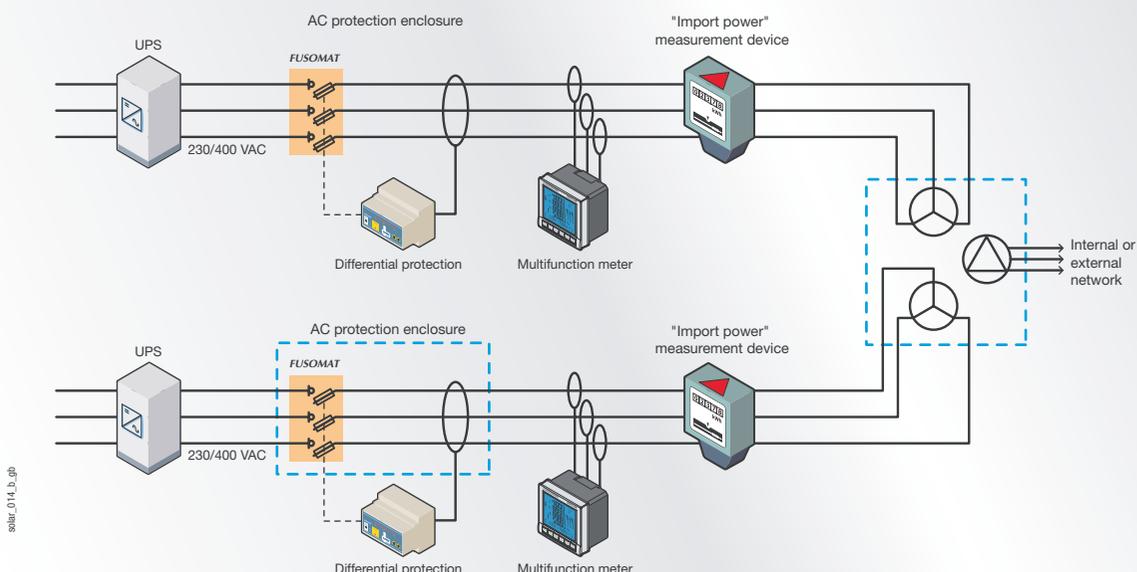


Alternate current side (AC)

The differential protection device in association with a trigger switch must be chosen as follows:

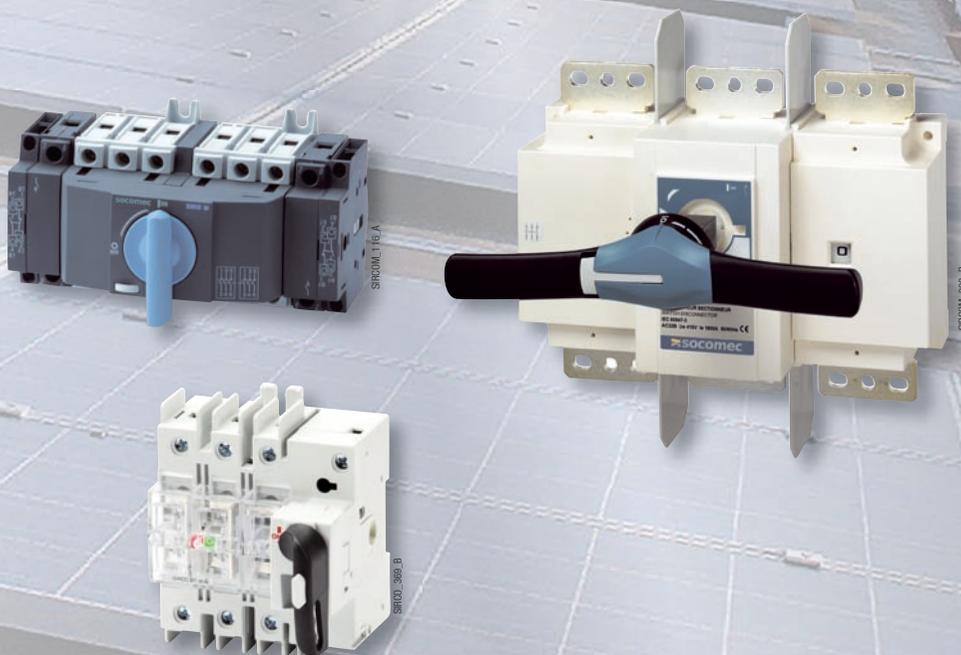
- Type A differential relay (RESYS M40) if the PV inverter does not generate a DC component connected to earth in case of a fault downstream,
- Type B differential relay (RESYS B420) in the opposite case.

An energy balance can be very helpful to compare the energy extracted from the various inverters. Several DIRIS A40 (1 per inverter) associated with a CONTROL VISION software will allow determining load curves in order to optimise the power generated by the entire PV unit.



Insight into DC load break switches

Load break switches



Load break switch for PV applications from 40 to 1250 A

⇒ DC interruption and disconnection

The **DC disconnect** used for a PV application must be placed upstream the inverter. It allows the electrical insulation of the photovoltaic field during installation, maintenance or repair operations (IEC 60364-7-712 standards).

The disconnect must:

- insulate the 2 polarities,
- be dedicated to the application,
- be located upstream and close to the inverter.

However, to be sure that the disconnection is not made under charge inadvertently or by an unsuited person, it is advisable to place a disconnection switch allowing a load break and disconnection

⇒ Load and overload interruption

This action is ensured by devices that have been defined to establish and break specific loads.

Type tests allow determining the devices applicable for establishing and breaking these loads.

These features correspond to the equipment use category.

⇒ Breaking and making capacity

Taking all the possible sunlight variations into account, the maximum current in a PV installation can reach 1.25 times the running current.

According to the construction standards IEC 60947-1 and IEC 60947-3, the breaking capacity and the making capacity correspond to the maximum performance values of the categories of use.

Even after these extreme uses, the switch guarantees its features.

In the DC 21 category of use, the switch can establish and interrupt up to 1.5 times the running current.

Example:

SIRCO DC 125 A, whose rated running current is of 63 A under 800 VDC in the DC21B category of use, will be able to occasionally establish and break a current of 94.5 A.

⇒ Sizing a load break switch in extreme conditions

Circuit features

- Optimal working voltage, U_n :
24 21V modules = 504 VDC
- Open circuit voltage, V_{oc} :
24 21.78V modules = 522 VDC
- Short-circuit current, I_{sc} : 7 channels of 8 A = 56 A

Sizing rule

The components are sized taking all the possible extreme weather variations into account:

Voltage: $V_{oc} \times 1.15 = 522 \times 1.15 = 600$ VDC

Current: $I_{sc} \times 1.25 = 56 \times 1.15 = 70$ A

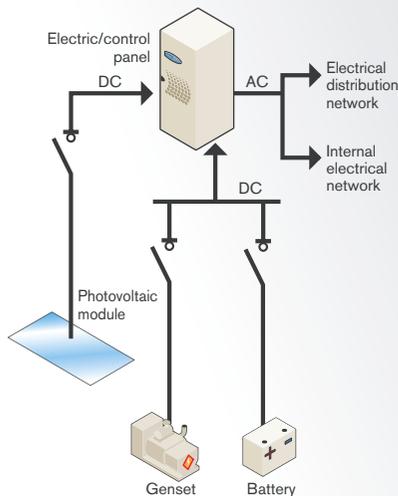
(under $504 \times 1.15 = 579.6$ VDC)

⇒ Reminder

DC difficulties derive from voltage interruption. Contrary to AC, it never returns to 0. Connecting the terminals in series eases breaking the load.

The load break switch placed in a DC kit must not be handled during normal operation. The installation insulation must be made on the AC side first, and then on the DC, thus giving the possibility, for example, to intervene on the inverter. This intervention must be carried out by a professional.

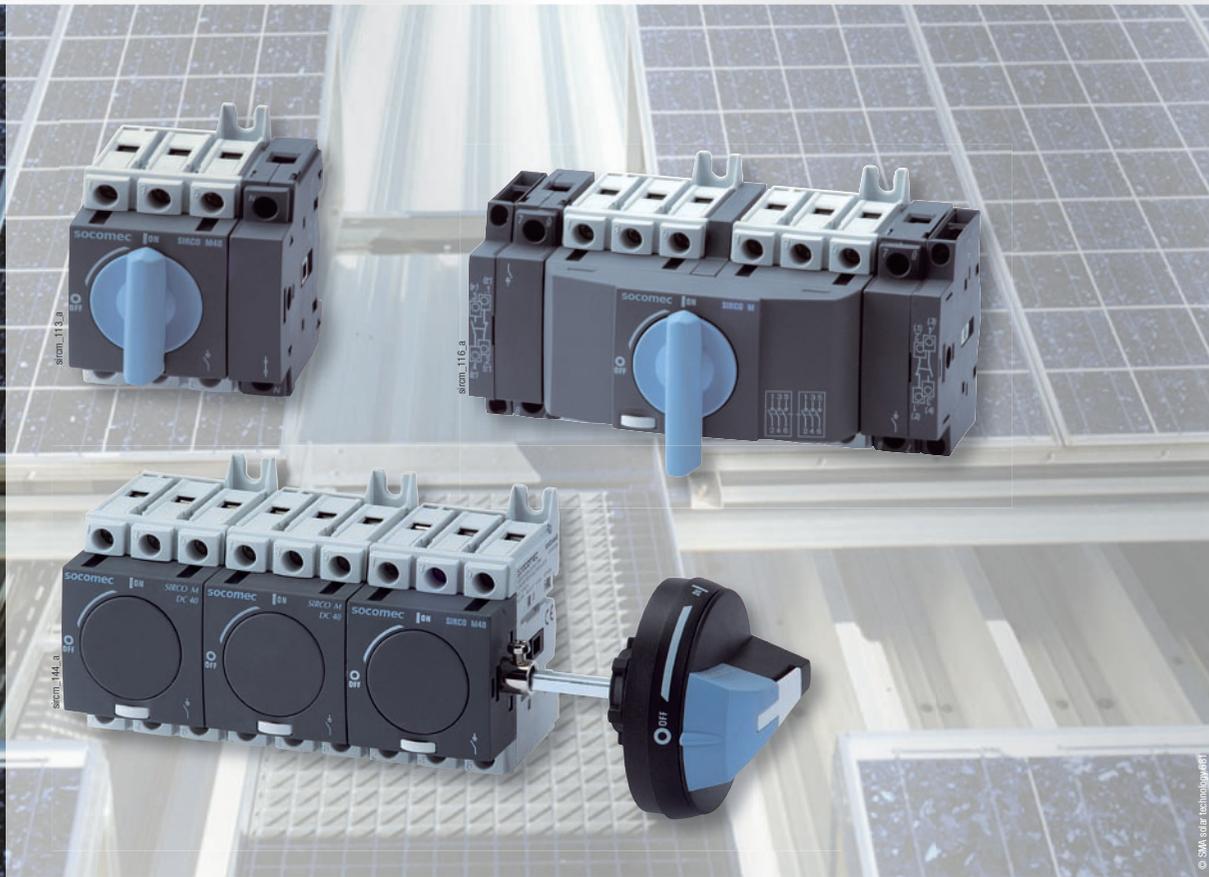
⇒ What you need to know



PV is an application that requires DC21 category protection devices in compliance with the electrical safety standards.

A photovoltaic application must have a safety device to meet the technical requirements. The renewable energy producer must give a very clear separation between the solar panel and the rest of the installation to be able to provide an intervention.





Load break switch for 40 and 80 A PV applications

➤ Function

SIRCO DC are manually operated multipolar load switches. They break on and off under load and provide safety isolation for any low voltage circuit of photovoltaic applications.

➤ General characteristics

- Modular and modifiable device.
- Fully visible breaking.
- Double break per phase.
- Contact point technology.
- DIN rail/back plate mounted or mounted on modular panel with 45 mm front cutout.
- For panel mounting device, use the "Door mounting kit" (see accessories)..

➤ Customised solutions

- SIRCO M DC 9 and 12 poles.
- SIRCO M DC and SIRCO M for simultaneous AC / DC circuit break.
- SIRCO M DC mixed rating.
- SIRCOVER M DC : see page 56.

➤ Conformity to standards

- IEC 60947-3
- EN 60947-3
- IEC 60364-4-410 (protection against electric shock)
- IEC 60364-7-712 (building electrical installations - Part 7-712: rules for special installations or placements - Photovoltaic power supplies)

➤ Available on request

- Other ratings: please consult us.
- Enclosed multipole devices: please consult us.

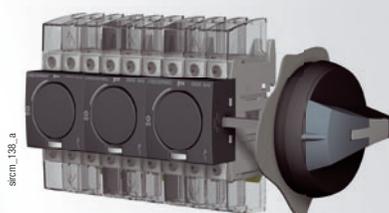
➔ **What you need to know**

- SIRCO M DC can be operated in different ways:

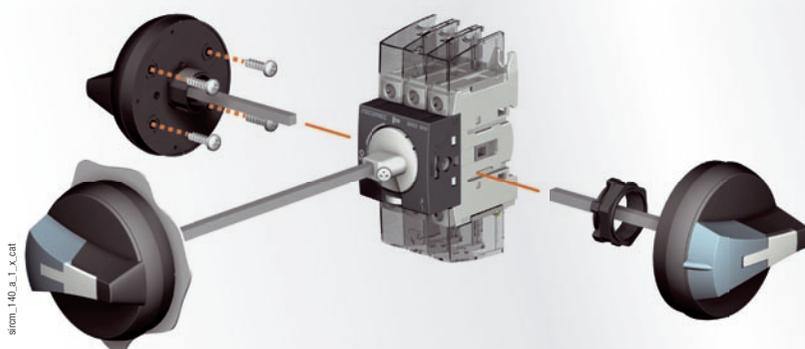
Direct operation



External side operation



External operation



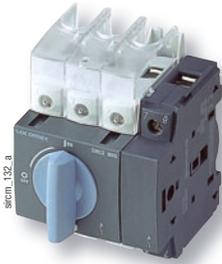
- SIRCO M DC a **3-pole** switch that can be configured according to the PV installation characteristics. Various accessories, such as auxiliary contacts and door-mounting kits, complete the range.
- SIRCO M DC is generally installed at the PV generator junction box.

➔ **Zoom**



- Associate **SIRCO M DC** with **SIRCO M** to simultaneously break the DC and AC circuits (please consult us).
- **Think about it...**
Associate a protection against overcurrents and overvoltage due to lightning (see page 86).
- **Need an equipped enclosure?**
No problem with our customised product service. We have solutions for any requirement.
For further information, please contact your SOCOMEC agency.

➔ References



SIRCO M DC from 40 to 80 A

| Rating (A) | No. of poles | Switch body | Direct handle | Door interlocked external front and right side handle | Door interlocked external left side handle | Shaft extensions for external front and side handle | Switched fourth pole module | Auxiliary contacts | Conversion kit |
|------------|--------------|-------------|--|---|--|---|-----------------------------|---|---|
| 40 A | 3 P | 22DC 3004 | Blue 2299 5012 | S00-type I - 0 Black IP55 1471 1111 ⁽¹⁾ | S00-type I - 0 Black IP65 147A 5111 | 150 mm 1407 0515 | 1 P 22DC 1004 | M-type 1 NO + NC contact 2299 0001 | Load break switches 6/8 P 2269 6009 ⁽²⁾ |
| | | | Red 2299 5013 | Black IP65 1473 1111 ⁽¹⁾ | | 200 mm 1407 0520 | | | |
| 80 A | 3 P | 22DC 3008 | Red/Yellow IP65 1474 1111 ⁽¹⁾ | Red/Yellow IP65 147B 5111 | Red/Yellow IP65 147B 5111 | 320 mm 1407 0532 | 1 P 22DC 1008 | 2 NO contact 2299 0011 | |

➔ Accessories

Handles and shafts

Direct handle

M00 handle

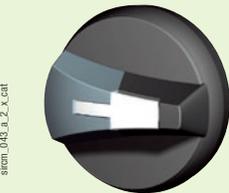


For SIRCO M DC

| Rating (A) | Handle colour | Handle | Reference |
|------------|---------------|----------|-----------|
| 40 ... 80 | Blue | M00-type | 2299 5012 |
| 40 ... 80 | Red | M00-type | 2299 5013 |

Door interlocked external handle

S00 handle



Front and right side operation I - 0

| Rating (A) | Handle colour | Handle | External IP | Reference |
|------------|---------------|----------|-------------|--------------------------|
| 40 ... 80 | Black | S00-type | IP55 | 1471 1111 ⁽¹⁾ |
| 40 ... 80 | Black | S00-type | IP65 | 1473 1111 ⁽¹⁾ |
| 40 ... 80 | Red/Yellow | S00-type | IP65 | 1474 1111 ⁽¹⁾ |

(1) Defeatable handle.

Left side operation I - 0

| Rating (A) | Handle colour | Handle | External IP | Reference |
|------------|---------------|----------|-------------|-----------|
| 40 ... 80 | Black | S00-type | IP65 | 147A 5111 |
| 40 ... 80 | Red/Yellow | S00-type | IP65 | 147B 5111 |

Use

Compact and robust, the new "S" type rotary handle enables the same switch to be operated either with a front, left side or right side external handle.

Other reduced handles: please consult us

Shaft extensions for external handle

siem_045_a_2_x.cat



Use

Standard lengths:
- 150 mm,
- 200 mm,
- 320 mm,
Other lengths: please consult us.

As for 3 and 4-pole switches, shaft extensions are for front and external side handle.
For 6 and 8-pole switches associated with a conversion kit, shaft extensions for front handle only.
For 6 and 8-pole switches with pole joining accessories, shaft extension for external side handle only.

For SIRCO M DC

| Rating (A) | Dimensions (mm) | Reference |
|------------|-----------------|-----------|
| 40 ... 80 | 150 | 1407 0515 |
| 40 ... 80 | 200 | 1407 0520 |
| 40 ... 80 | 320 | 1407 0532 |

Other accessories

Additional poles for SIRCO M DC

Switched fourth pole module

Use

Adds one or two poles and transforms:
- 3 pole load break switches into a 4 pole,
- 6 pole load break switches into a 8 pole.

Switched fourth pole module

| Rating (A) | No. of poles | Type | Reference |
|------------|--------------|----------|-----------|
| 40 | 1 P | switched | 22DC 1004 |
| 80 | 1 P | switched | 22DC 1008 |

Neutral pole

siem_072_b



Use

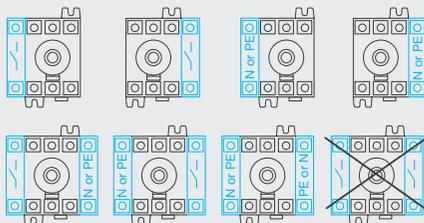
Transforms the 3-pole switch into a 3-pole + solid neutral.

Neutral pole

| Rating (A) | No. of poles | Type | Reference |
|------------|--------------|------------|-----------|
| 40 | 1 P | unswitched | 2200 5005 |
| 80 | 1 P | unswitched | 2200 5009 |

Protective earth module

siem_078_a_1_gb.cat



Use

Adds 1 protective earth module to the load break switch.

Protective earth module

| Rating (A) | No. of poles | Type | Reference |
|------------|--------------|------------|-----------|
| 40 | 1 P | unswitched | 2200 9005 |
| 80 | 1 P | unswitched | 2200 9009 |

Terminal shrouds

siem_049_a_1_x.cat



Use

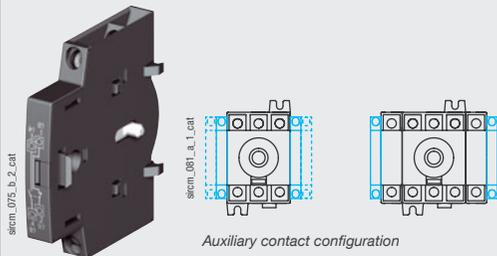
In batches of 2, they guarantee protection top and bottom against direct contact with the terminals or connection parts.
1 or 3-pole versions available.

Perforations allowing thermographic inspection without removing.

For SIRCO M DC

| Rating (A) | No. of poles | Position | Reference |
|------------|--------------|----------------|-----------|
| 40 | 1 P | top and bottom | 2294 1005 |
| 40 | 3 P | top and bottom | 2294 3005 |
| 80 | 1 P | top and bottom | 2294 1009 |
| 80 | 3 P | top and bottom | 2294 3009 |

M type auxiliary contacts



Use
Pre-break and signalisation of positions 0 and I by NO+NC or 2 NO auxiliary contacts.
They can be mounted on the left or on the right side of the device.
Max 4 auxiliary contacts (2 modules).

Characteristics
NO+NC auxiliary contacts: IP2 with front operation.

For SIRCO M DC

| Rating (A) | Contact position | Contact type | Reference |
|------------|------------------|--------------|-----------|
| 40 ... 80 | 1 AC | NO + NC | 2299 0001 |
| 40 ... 80 | 1 AC | 2 NO | 2299 0011 |

Conversion kit

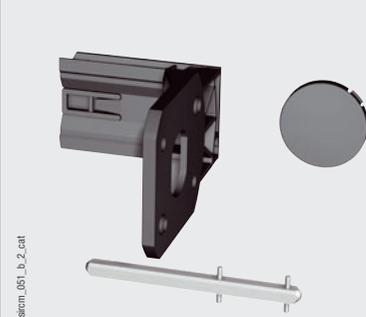


Conversion kit for 6 and 8-pole load break switches

Use
This accessory enables the assembly of two 3 pole switches + additional poles in order to achieve 6 or 8 pole SIRCO M load break switches.
For direct operation, the handle is included but not the shaft.
For external operation, add the handle + the shaft.

| Rating (A) | Type | Reference |
|------------|------------------------------|-----------|
| 40 ... 80 | 6/8-pole load break switches | 2269 6009 |

Door / Panel mounting kit



Use
This kit enables direct mounting of the standard 3 or 4-pole switch on the door panel, on the right or left side of the panel.
Moreover, the connection clamps of the switch are always accessible.

The external handle is quick and easy to install due to an internal locking nut mounted on the inside of the enclosure.

2 kits are available:
- 1 for complete protection IP2X,
- 1 with overall dimensions reduced.

For SIRCO M DC

| Rating (A) | No. of poles | Description | Reference |
|------------|--------------|----------------------------|--------------------------|
| 40 ... 80 | 3 / 4 P | Complete protection IP2X | 2299 3309 ⁽¹⁾ |
| 40 ... 80 | 3 / 4 P | Overall dimensions reduced | 2299 3409 ⁽¹⁾ |

(1) Delivered with shaft.

Cap for side operation mounting



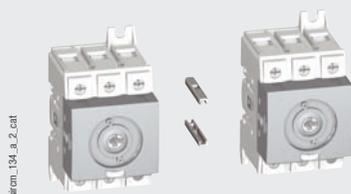
Use
Accessory for capping the front face of the SIRCO M DC when utilising in side operation.
20 units per pack.

This piece can be snapped on the switch body directly.

For SIRCO M DC

| Rating (A) | Pack qty | Reference |
|------------|-----------|-----------|
| 40 ... 80 | 20 pieces | 2299 9409 |

6/8 pole joining accessory



sirom_134_a_2_cat

Use

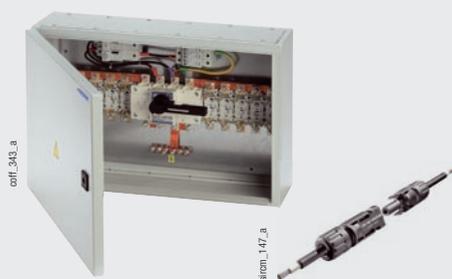
40 units per pack, they allow the joining of two 3-pole switches (+ additional pole) in order to form a 6 or 8-pole switch for external side operation.

For multi-pole switches, please consult us.

For SIRCO M DC

| Rating (A) | Pack qty | Reference |
|------------|-----------|-----------|
| 40 ... 80 | 40 pieces | 2299 9909 |

Customised solutions



conf_343_a

sirom_147_a

Our services are regularly sought for producing customised enclosures and panels meeting all your requirements:

- enclosures with simple load break switches,
- enclosed fuse protection switches,
- enclosed changeover switches,
- complete integrated equipment.

Available on request:

- sheet metal, insulated, varnished (seaside) or brushed stainless steel versions,
- special colours (enclosure, handle),
- customised dimensions,
- customised connections: classe II quick connectors.

For any request of customised products, please contact your SOCOMEC agency.

PV generator connection enclosure



conf_359_a

When they are not intended to be mounted in a enclosure, load break, changeover or fuse protection switches are usually delivered enclosed. Located the nearest possible to the operator, they guarantee:

- protection for the inverters and PV generators against overvoltage coupling,
- disconnection under DC load between the inverters and PV generators (necessary according to the IEC 60364-712 standard).

Specialised in load break, changeover and fuse protection, SOCOMEC designs and produces a large number of standard or customised enclosures. This double expertise will allow you to make use of complete systems that meet all your requirements.

➔ SIRCO M DC - Enclosure references

SIRCO M DC polycarbonate enclosure



diff_337_a_1_cat

➔ References

Empty enclosures

| Rating (A) | No. of poles | Handle colour | Enclosure colour | Reference |
|------------|--------------|---------------|------------------|-----------|
| 40 | 3 P | Black | Grey | 2215 9305 |
| 40 | 3 P | Red | Yellow | 2215 9405 |
| 80 | 3 P | Black | Grey | 2215 9309 |
| 80 | 3 P | Red | Yellow | 2215 9409 |

Enclosed switches

| Rating (A) | No. of poles | Handle colour | Enclosure colour | Reference |
|------------|--------------|---------------|------------------|-----------|
| 40 | 3 P | Black | Grey | 22DC 3304 |
| 40 | 3 P | Red | Yellow | 22DC 3404 |
| 80 | 3 P | Black | Grey | 22DC 3308 |
| 80 | 3 P | Red | Yellow | 22DC 3408 |

➔ General characteristics

- Equipped with a 3-pole SIRCO M DC.
- 1 removable neutral terminal and 1 removable earth terminal.
- Protection IP65.
- Possibility of 1 adding additional pole.
- Possibility of 1 adding M type auxiliary contact module.

Enclosed SIRCO M DC 40 A

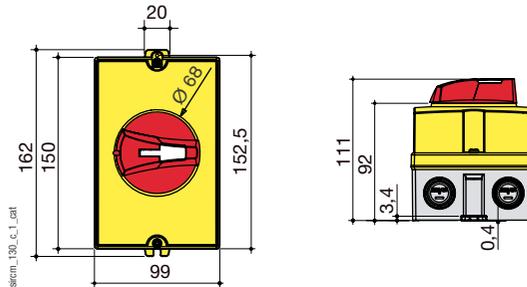
- 4 M16 pre-drill holes.
- 8 M20 pre-drill holes.
- 4 M25 pre-drill holes.

Enclosed SIRCO M DC 80 A

- 4 M16 pre-drill holes.
- 6 M25/M32 pre-drill holes.

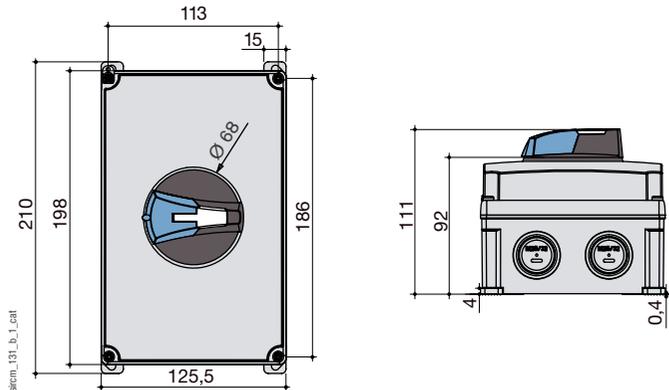
➔ Dimensions

Enclosed SIRCO M DC 40 A



diff_130_c_1_cat

Enclosed SIRCO M DC 80 A



diff_131_b_1_cat

➔ Characteristics according to IEC 60947-3

SIRCO M DC

| | | |
|--|------|------|
| Thermal current I_{th} 40°C | 40 A | 80 A |
| Rated insulation voltage U_i (V) | 800 | 800 |
| Rated impulse withstand voltage U_{imp} (kV) | 8 | 8 |

Rated operational currents I_o (A)

| Rated voltage | Load duty category | Number of poles of the device | Number of poles in series per polarity | B | B |
|---------------|--------------------|-------------------------------|--|----|----|
| 48 VDC | DC-21 B | 3 P | 1 P | 40 | 80 |
| 220 VDC | DC-21 B | 3 P | 1 P | 32 | 40 |
| 400 VDC | DC-21 B | 4 P | 2 P | 32 | 40 |
| 440 VDC | DC-21 B | 4 P | 2 P | 32 | 40 |
| 500 VDC | DC-21 B | 4 P | 2 P | 32 | 40 |
| 600 VDC | DC-21 B | 6 P | 3 P | 25 | 40 |
| 700 VDC | DC-21 B | 8 P | 4 P | 25 | 40 |
| 750 VDC | DC-21 B | 8 P | 4 P | 25 | 40 |
| 800 VDC | DC-21 B | 8 P | 4 P | 25 | 40 |

Overload capacity

| | | |
|---|-----|---|
| Rated short-time withstand current 0.3 s. I_{cw} (kA rms) | 2.5 | 3 |
| Rated short-circuit making capacity I_{cm} (kA peak) ⁽¹⁾ | 6 | 9 |

Connection

| | | |
|---|---------|------------|
| Minimum Cu cable section (mm ²) | 1.5 | 2.5 |
| Maximum Cu cable section (mm ²) | 16 | 35 |
| Tightening torque min./max.(Nm) | 2 / 2.2 | 3.5 / 3.85 |

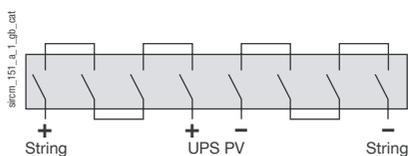
Mechanical characteristics

| | | |
|--|---------|---------|
| Endurance (number of operating cycles) | 100 000 | 100 000 |
| Operating effort (Nm) | 0.8 | 1 |
| Weight of 3 P switch (kg) | 0.16 | 0.26 |

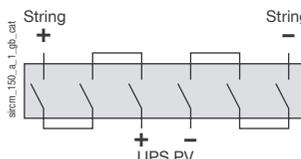
(1) For a rated operation voltage $U_n = 400$ VAC.

➔ Connections

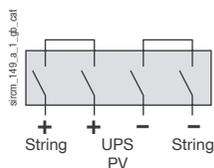
8 pole



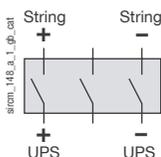
6 pole



4 pole



2 pole

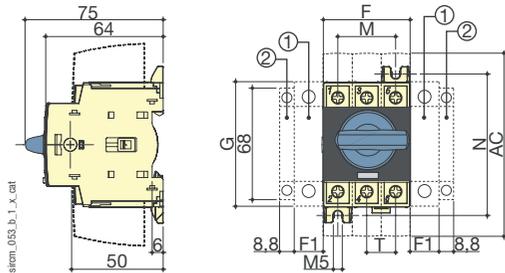


➤ **Dimensions**

SIRCO M DC

40 to 80 A

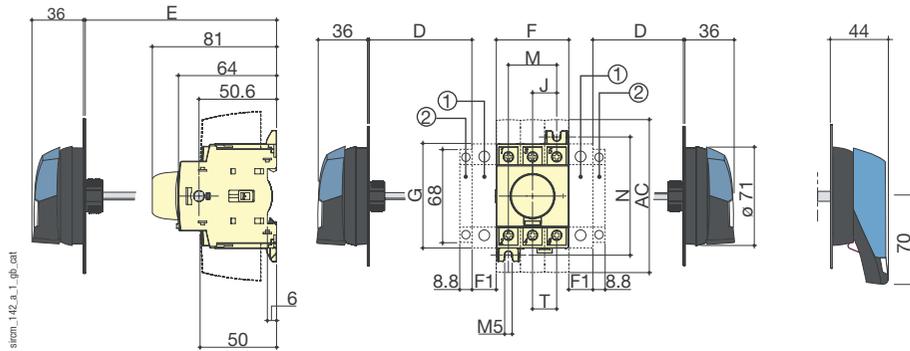
Direct operation with handle



- 1. 1 switched fourth pole module (1 per device max.) or 1 unswitched neutral pole or 1 protective earth module or 1 auxiliary contact.
 - 2. 1 auxiliary contact only.
- Note: Max 4 additional blocks.**

External frontal operation

External side operation

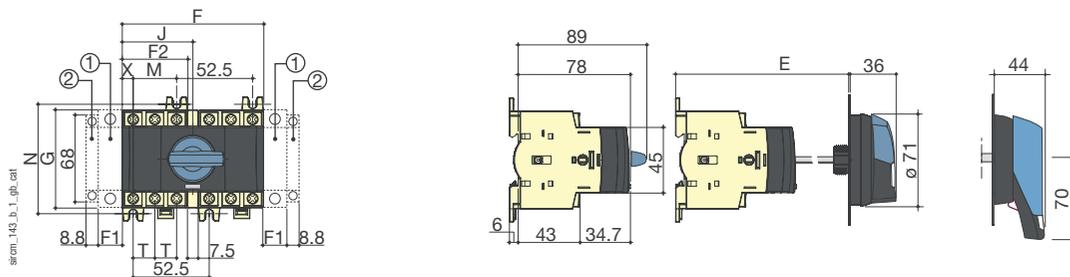


- 1. 1 switched fourth pole module (1 per device max.) or 1 unswitched neutral pole or 1 protective earth module or 1 auxiliary contact.
 - 2. 1 auxiliary contact only.
- Note: Max 4 additional blocks.**

| Rating (A) | Overall dimensions | | | | Terminal shrouds | | | Switch body | | | Switch mounting | | Connection terminals |
|------------|--------------------|-------|-------|-------|------------------|------|------|-------------|------|----|-----------------|------|----------------------|
| | D min | D max | E min | E max | AC | F | F1 | G | J | M | N | T | |
| 40 | 30 | 235 | 100 | 372 | 110 | 45 | 15 | 68 | 15 | 30 | 75 | 15 | |
| 80 | 30 | 235 | 100 | 372 | 110 | 52.5 | 17.5 | 76 | 17.5 | 35 | 85 | 17.5 | |

Direct front operation for 6and 8-pole device

Direct front external operation for 6and 8-pole load break switches

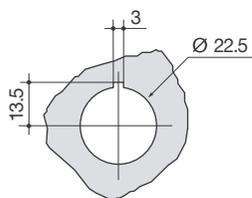


- 1. 1 switched fourth pole module (1 per device max.) or 1 unswitched neutral pole or 1 protective earth module or 1 auxiliary contact.
 - 2. 1 auxiliary contact only.
- Note: Max 4 additional blocks.**

| Rating (A) | Overall dimensions | | Switch body | | | | Switch mounting | | Connection terminals | | |
|------------|--------------------|-------|-------------|------|------|----|-----------------|----|----------------------|------|------|
| | E min | E max | F | F1 | F2 | G | J | M | N | T | X |
| 40 | 105 | 372 | 97.5 | 15 | 45 | 68 | 48.75 | 30 | 75 | 15 | 7.5 |
| 80 | 105 | 372 | 105 | 17.5 | 52.5 | 76 | 52.5 | 35 | 85 | 17.5 | 8.75 |

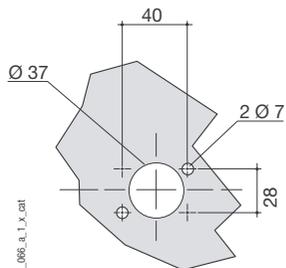
➔ **Door drilling - S00**

With fixing nut



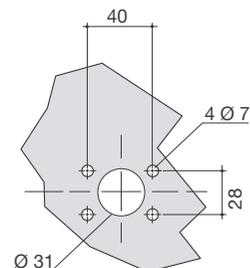
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IP55 - with 2 fixing clips



siem_066_a_1_x_cat

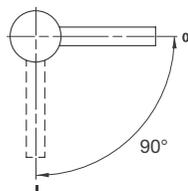
IP65 - with 4 fixing screws



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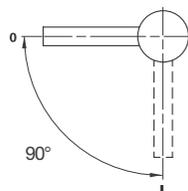
➔ **Operating handle - S00**

Front and right side operation



siem_068_c_1_x_cat

Left side operation



siem_069_c_1_x_cat



➤ What you need to know

- In front direct or external operation, SIRCO DC is available in 3 and 4-pole versions from 125 to 1250 A. The switch can be enclosed in a polyester or sheet metal housing from 125 to 1250 A.

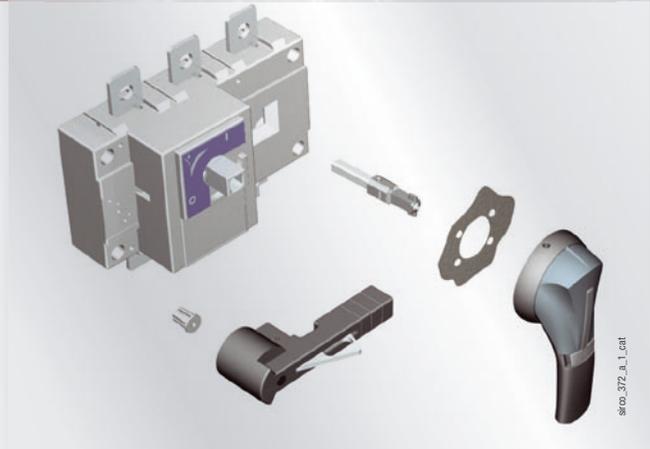
DC disconnecting switch from 40 to 1250 A

➤ Function

SIRCO DC are manually operated multipolar load break switches. They break on and off under load and provide safety isolation for any low voltage circuit of photovoltaic applications.

➤ General characteristics

- Fully visible breaking.
- Backplate or DIN rail mounting with 45 mm cut-out up to 40A.
- High thermal and dynamic withstand.
- $U_i = 1\ 000\ \text{VDC}$.



➤ Available on request

- Motorised switch-disconnectors.
- Other ratings: please consult us.
- Enclosed devices: please consult us.

➤ Conformity to standards

- IEC 60947-3
- EN 60947-3
- VDE 0660-107 (1992)
- IEC 60364-4-410 (protection against electric shock)
- IEC 60364-7-712 (building electrical installations - Part 7-712: rules for special installations or placements - Photovoltaic power supplies)
- DIN VDE 0126

References

sirco_208_n1_cat



Front operation

| Rating (A) | No. of poles | Switch body | Direct front operation handle | External handle | Shaft extensions for external handle | Auxiliary contacts | Terminal shrouds | Terminal screen | Inter phase barrier |
|------------|--------------|-------------|-----------------------------------|---|--|--|---------------------------------|---------------------------------|---------------------|
| 40 A | 3 P | 25DC 4004 | Black 3629 4012 ⁽¹⁾ | Type S1 Black IP55 1411 2111 ⁽¹⁾ | 200 mm | 1 NC contact 3999 0701 ⁽²⁾ 1 NO contact 3999 0702 ⁽²⁾ | | | |
| | 4 P | | Red 3629 4013 | Black IP65 1413 2111 | 1401 0520 ⁽¹⁾ 320 mm 1401 0532 | 1 NO/NC contact 3999 0001 2 NO/NC contacts 3999 0002 | | | |
| 125 A | 3 P | 26DC 3014 | Black 2699 5042 ⁽¹⁾ | Type S2 Black IP55 1421 2111 ⁽¹⁾ | 200 mm 1400 1020 320 mm 1400 1032 ⁽¹⁾ 500 mm 1400 1050 | 1st NO/NC contact 2699 0031 2nd NO/NC contact 2699 0032 | 3 P 2694 3014 ⁽³⁾ | 3 P 2698 3012 ⁽³⁾ | 3 P 2998 0033 |
| | 4 P | 26DC 4014 | Red 2699 5043 | | | | 4 P 2694 4014 ⁽³⁾ | 4 P 2698 4012 ⁽³⁾ | 4 P 2998 0034 |
| 250 A | 3 P | 26DC 3026 | Black 2699 5052 ⁽¹⁾ | Black IP65 1423 2111 | 200 mm 1400 1020 320 mm 1400 1032 ⁽¹⁾ 500 mm 1400 1050 | 1st NO/NC contact 2699 0031 2nd NO/NC contact 2699 0032 | 3 P 2694 3021 ⁽³⁾ | 3 P 2698 3020 ⁽³⁾ | 3 P 2998 0023 |
| | 4 P | 26DC 4026 | | | | | 4 P 2694 4021 ⁽³⁾ | 4 P 2698 4020 ⁽³⁾ | 4 P 2998 0024 |
| 315 A | 3 P | 26DC 3032 | Red 2699 5053 | Red IP65 1424 2111 | 200 mm 1401 1520 320 mm 1401 1532 400 mm 1401 1540 | 1st NO/NC contact 2699 0031 2nd NO/NC contact 2699 0032 | 3 P 2694 3051 ⁽³⁾ | 3 P 2698 3050 ⁽³⁾ | 3 P 2998 0013 |
| | 4 P | 26DC 4032 | | | | | 4 P 2694 4051 ⁽³⁾ | 4 P 2698 4050 ⁽³⁾ | 4 P 2998 0014 |
| 630 A | 3 P | 26DC 3064 | Black 2799 7012 | Type S4 Black IP65 1443 3111 | 200 mm 1401 1520 320 mm 1401 1532 400 mm 1401 1540 | 1st NO/NC contact 2699 0031 2nd NO/NC contact 2699 0032 | | 3 P 2698 3080 | |
| | 4 P | 26DC 4064 | | | | | | 4 P 2698 4080 | |
| 800 A | 3 P | 26DC 3081 | Red 2799 7013 | Red/Yellow IP65 1444 3111 | 200 mm 1401 1520 320 mm 1401 1532 400 mm 1401 1540 | 1st NO/NC contact 2699 0031 2nd NO/NC contact 2699 0032 | | 3 P 2698 3120 | |
| | 4 P | 26DC 4081 | | | | | | 4 P 2698 4120 | |
| 1000 A | 3 P | 26DC 3100 | Red 2799 7013 | Red/Yellow IP65 1444 3111 | 200 mm 1401 1520 320 mm 1401 1532 400 mm 1401 1540 | 1st NO/NC contact 2699 0031 2nd NO/NC contact 2699 0032 | | 3 P 2698 3120 | |
| | 4 P | 26DC 4100 | | | | | | 4 P 2698 4120 | |
| 1250 A | 3 P | 26DC 3121 | Red 2799 7013 | Red/Yellow IP65 1444 3111 | 200 mm 1401 1520 320 mm 1401 1532 400 mm 1401 1540 | 1st NO/NC contact 2699 0031 2nd NO/NC contact 2699 0032 | | 3 P 2698 3120 | |
| | 4 P | 26DC 4121 | | | | | | 4 P 2698 4120 | |

(1) Standard.
(2) For external operation.
(3) Top / bottom.

➔ SIRCO DC - Accessories

Handles and shafts

Direct operation handle



Direct front operation handle SIRCO DC 40 A Direct front operation handle SIRCO DC 125 ... 315 A Direct front operation handle SIRCO DC 630 ... 1250 A

| Rating (A) | Handle colour | Reference |
|---------------|---------------|------------------|
| 40 | Black | 3629 4012 |
| 40 | Red | 3629 4013 |
| 125 | Black | 2699 5042 |
| 125 | Red | 2699 5043 |
| 250 ... 315 | Black | 2699 5052 |
| 250 ... 315 | Red | 2699 5053 |
| 630 ... 1 250 | Black | 2799 7012 |
| 630 ... 1 250 | Red | 2799 7013 |

External operation handle

S1-type handle

S4-type handle



Use

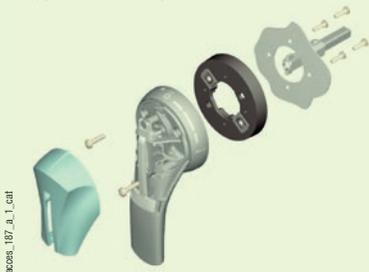
The door interlocked external operation includes a padlockable handle, an escutcheon and must be combined with a shaft extension.

Front operation

| Rating (A) | Handle | Handle colour | external IP ⁽¹⁾ | Reference |
|---------------|---------|---------------|----------------------------|---------------------------------|
| 40 | Type S1 | Black | IP55 | 1411 2111 |
| 40 | Type S1 | Black | IP65 | 1413 2111 |
| 40 | Type S1 | Red/Yellow | IP65 | 1414 2111 |
| 125 ... 315 | Type S2 | Black | IP55 | 1421 2111 ⁽²⁾ |
| 125 ... 315 | Type S2 | Black | IP65 | 1423 2111 |
| 125 ... 315 | Type S2 | Red/Yellow | IP65 | 1424 2111 |
| 630 ... 1 250 | Type S4 | Black | IP65 | 1443 3111 ⁽²⁾ |
| 630 ... 1 250 | Type S4 | Red | IP65 | 1444 3111 |

(1) IP: protection index according to the IEC 60529 standard.
(2) Standard.

S type handle adapter



Use

Enables new S type handles to be mounted using old fixing holes.

Dimensions

Adds 12 mm to the depth.

| Handle colour | external IP ⁽¹⁾ | To be ordered in multiples of | Reference |
|---------------|----------------------------|-------------------------------|------------------|
| Black | IP65 | 10 | 1493 0000 |

(1) IP: protection index according to the IEC 60529 standard.

Alternative S-type handle cover colours



Use

For single lever handles type S1, S2, S3 and double arm lever handle, type S4. Other colours: please consult us.

| Handle colour | To be ordered in multiples of | Handle | Reference |
|---------------|-------------------------------|-------------|------------------|
| Light grey | 50 | Type S1, S2 | 1401 0001 |
| Dark grey | 50 | Type S1, S2 | 1401 0011 |
| Light grey | 50 | Type S4 | 1401 0031 |
| Dark grey | 50 | Type S4 | 1401 0041 |

Shaft extensions for external handle



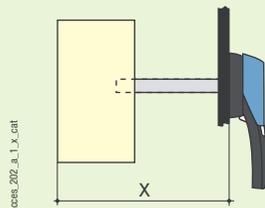
SIRCO DC 40 A shaft



SIRCO DC 125 shaft ... 315 A



SIRCO DC 630 shaft ... 1250 A



Use

Standard lengths:

- 200 mm,
- 250 mm,
- 320 mm,
- 400 mm,
- 500 mm,
- 750 mm,

Other lengths: please consult us.

For 3/4 pole

| Rating (A) | Dimension X (mm) | Shaft length (mm) | Reference |
|---------------|------------------|-------------------|--------------------------|
| 40 | 100 ... 245 | 200 mm | 1401 0520 |
| 40 | 100 ... 365 | 320 mm | 1401 0532 |
| 250 | 95 ... 230 | 200 mm | 1400 1020 |
| 125 | 125 ... 300 | 250 mm | 1400 1025 |
| 125 | 125 ... 370 | 320 mm | 1400 1032 ⁽¹⁾ |
| 125 | 125 ... 550 | 500 mm | 1400 1050 |
| 125 | 125 ... 850 | 750 mm | 1400 1075 |
| 250 | 135 ... 265 | 200 mm | 1400 1020 |
| 250 | 135 ... 315 | 250 mm | 1400 1025 |
| 250 | 135 ... 385 | 320 mm | 1400 1032 ⁽¹⁾ |
| 250 | 135 ... 565 | 500 mm | 1400 1050 |
| 250 | 135 ... 880 | 750 mm | 1400 1075 |
| 315 | 165 ... 295 | 200 mm | 1400 1020 |
| 315 | 165 ... 345 | 250 mm | 1400 1025 |
| 315 | 165 ... 415 | 320 mm | 1400 1032 ⁽¹⁾ |
| 315 | 165 ... 595 | 500 mm | 1400 1050 |
| 315 | 165 ... 940 | 750 mm | 1400 1075 |
| 630 ... 1 250 | 221 ... 343 | 200 mm | 1401 1520 |
| 630 ... 1 250 | 221 ... 463 | 320 mm | 1401 1532 ⁽¹⁾ |
| 630 ... 1 250 | 221 ... 543 | 400 mm | 1401 1540 |

(1) Standard.

Other accessories

Shaft guide for external operation



Use

To guide the shaft extension in the external handle.

This accessory enables the handle to engage extension shaft with a misalignment of up to 15 mm.

Required for a shaft length over 320 mm.

| Description | Reference |
|-------------|-----------|
| Shaft guide | 1429 0000 |

Door mounting kit

Use

This kit allows easy door mounting for the SIRCO range.

For 3 and 4-pole for frontal direct operation

| Rating (A) | No. of poles | Reference |
|------------|--------------|-----------|
| 125 | 3 P | 2699 3312 |
| 125 | 4 P | 2699 4312 |
| 250 | 3 P | 2699 3420 |
| 250 | 4 P | 2699 4420 |

6/8 pole kit



Use

This accessory enables the assembly of 2 SIRCO DC 4x40A switches in order to obtain:
 - an 8-pole load break switch,
 - a 4-pole combination switch.

For 3 and 4-pole for frontal direct operation

| Rating (A) | No. of poles | Reference |
|------------|--------------|-----------|
| 40 | 6 / 8 pole | 3629 7710 |

Auxiliary contacts



A type auxiliary contacts



U type auxiliary contacts



Characteristics

For SIRCO DC 40A: Bifunction type NO/NC auxiliary contact.

- low level from 1 mA and 5 V
- standard up to 5 A and 250 V

For SIRCO DC 1250A:

NO/NC AC: IP2 with front and side operation.

Connection to the control circuit

6.35 mm fast-on connection.

Electrical characteristics

30 000 operations.

Characteristics

| Rating (A) | Contact type | Current Nominal current (A) | Rated operational currents I _e (A) | | | | | | | | | |
|---------------|--------------|-----------------------------|---|----------|---------|----------|--------|-------|-------|--------|-------|-------|
| | | | 230 VAC | | 400 VAC | | 24 VDC | | | 48 VDC | | |
| | | | AC-12 | AC-13/15 | AC-12 | AC-13/15 | DC-12 | DC-13 | DC-14 | DC-12 | DC-13 | DC-14 |
| 125 ... 1 250 | NO/NC | 16 | 16 | 4 | 12 | 3 | 2.5 | 2.5 | 1 | 2.5 | 1.2 | 0.2 |
| 125 ... 1 250 | NO+NC | 16 | 16 | 4 | 16 | 3 | 16 | 5 | 1 | 2.5 | 1.2 | 0.2 |

Use

Pre-break and signalling of positions 0 and I:

- 1 to 2 NO/NC auxiliary contacts,
- 1 to 4 NO+NC auxiliary contacts,
- 1 to 2 low level NO/NC auxiliary contacts.

NO/NC contact for 3 and 4 pole SIRCO

| Rating (A) | AC position | Type | Reference |
|---------------|-----------------|--------|-----------|
| 40 | 1 st | A-type | 3999 0001 |
| 40 | 2 nd | A-type | 3999 0002 |
| 125 ... 1 250 | 1 st | - | 2699 0031 |
| 125 ... 1 250 | 2 nd | - | 2699 0032 |

NO/NC contact for 3 and 4 pole SIRCO

| Rating (A) | AC position | Type | Reference |
|---------------|-----------------|------|-----------|
| 125 ... 1 250 | 1 st | - | 2699 0141 |
| 125 ... 1 250 | 2 nd | - | 2699 0142 |

Low level NO/NC contact for 3/4 pole SIRCO

| Rating (A) | AC position | Type | Reference |
|---------------|-----------------|------|-----------|
| 125 ... 1 250 | 1 st | - | 2699 0301 |
| 125 ... 1 250 | 2 nd | - | 2699 0302 |

NO/NC contact for 3 and 4 pole SIRCO

| Rating (A) | AC position | Type | Reference |
|------------|-------------|--------|-----------|
| 40 | 1 | U-type | 3999 0701 |

NO/NC contact for 3 and 4 pole SIRCO

| Rating (A) | AC position | Type | Reference |
|------------|-------------|--------|-----------|
| 40 | 1 | U-type | 3999 0702 |

Terminal shrouds



Use

Top or bottom protection against direct contact with terminals or connection parts.

Advantage

Perforations allowing remote thermographic without removal. The terminal shrouds also provide phase separation for SIRCOs from 125 to 315 A.

For 3/4 pole

| Rating (A) | No. of poles | Position | Reference |
|------------|--------------|--------------|-----------|
| 125 | 3 P | top / bottom | 2694 3014 |
| 125 | 4 P | top / bottom | 2694 4014 |
| 250 | 3 P | top / bottom | 2694 3021 |
| 250 | 4 P | top / bottom | 2694 4021 |
| 315 | 3 P | top / bottom | 2694 3051 |
| 315 | 4 P | top / bottom | 2694 4051 |

Terminal screen

access_079_a_1_cat



Use

Top and bottom protection against direct contacts with terminals or connecting parts.

For 3/4 pole

| Rating (A) | No. of poles | Position | Reference |
|-----------------|--------------|--------------|-----------|
| 125 | 3 P | top / bottom | 2698 3012 |
| 125 | 4 P | top / bottom | 2698 4012 |
| 250 | 3 P | top / bottom | 2698 3020 |
| 250 | 4 P | top / bottom | 2698 4020 |
| 315 | 3 P | top / bottom | 2698 3050 |
| 315 | 4 P | top / bottom | 2698 4050 |
| 630 ... 800 | 3 P | top / bottom | 2698 3080 |
| 630 ... 800 | 4 P | top / bottom | 2698 4080 |
| 1 000 ... 1 250 | 3 P | top / bottom | 2698 3120 |
| 1 000 ... 1 250 | 4 P | top / bottom | 2698 4120 |

Shrouded distribution block

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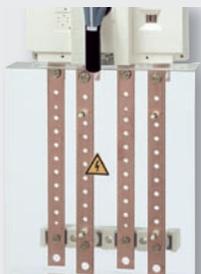
Use

Easy connection of several equipotential conductors, can be clipped onto a symmetric DIN rail.

| Rating (A) | No. of poles | No. of connections per section (mm ²) | Reference |
|------------|--------------|---|-----------|
| 125 | 3 / 4-pole | 2 x 25 + 7 x 10 | 5420 4108 |
| 125 | 3 / 4-pole | 2 x 25 + 2 x 16 + 9 x 10 | 5420 4112 |

Bottom distribution kit

repr_020_b_1_cat



Use

Easy connection of several equipotential conductors, downstream mounting of the SIRCO DC.

| Rating (A) | No. of poles | No. of connections per section (mm ²) | Reference |
|------------|--------------|---|-----------|
| 125 | 3 P | 1 x 95 + 8 x 25 | 5411 3016 |
| 125 | 4 P | 1 x 95 + 8 x 25 | 5411 4016 |
| 250 | 3 P | 1 x 150 + 8 x 50 | 5411 3025 |
| 250 | 4 P | 1 x 150 + 8 x 50 | 5411 4025 |
| 315 | 3 P | 1 x 240 + 8 x 95 | 5411 3040 |
| 315 | 4 P | 1 x 240 + 8 x 95 | 5411 4040 |

Cage terminals

access_053_a_1_cat



Use

Connection of bare copper cables onto the terminals (without spade lugs).

| Rating (A) | No. of poles | Reference |
|------------|--------------|-----------|
| 125 | 3 P | 5400 3016 |
| 125 | 4 P | 5400 4016 |
| 250 | 3 P | 5400 3025 |
| 250 | 4 P | 5400 4025 |
| 315 | 3 P | 5400 3040 |
| 315 | 4 P | 5400 4040 |

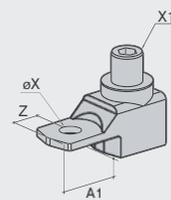
Connections

| Rating (A) | Cable section flexible (mm ²) | Cable section rigid (mm ²) | flexible bar width (mm) | Splitled over (mm) |
|------------|---|--|-------------------------|--------------------|
| 125 | 16 ... 95 | 16 ... 95 | 13 | 22 |
| 250 | 16 ... 185 | 16 ... 185 | 18 | 27 |
| 315 | 50 ... 240 | 50 ... 300 | 20 | 34 |

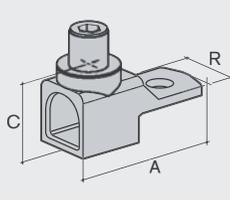
Dimensions

| Rating (A) | A | A1 | C | R | ØX | X1 | Z |
|------------|------|------|------|----|------|-----|----|
| 125 | 47.5 | 22.5 | 25 | 20 | 8.5 | M12 | 10 |
| 250 | 62 | 31.5 | 31.5 | 25 | 10.5 | M16 | 14 |
| 315 | 71.5 | 32 | 38 | 32 | 10.5 | M20 | 15 |

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access_092_a_1_x_cat



Inter phase barrier



access_006_a_1_x_cat

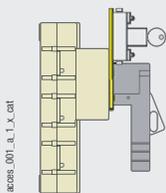
Use

Safety isolating separation between the terminals.
The terminal shrouds also provide phase separation for SIRCOs from 125 to 315 A.

| Rating (A) | No. of poles | Reference |
|---------------|--------------|-----------|
| 125 | 3 P | 2998 0033 |
| 125 | 4 P | 2998 0034 |
| 250 | 3 P | 2998 0023 |
| 250 | 4 P | 2998 0024 |
| 315 | 3 P | 2998 0013 |
| 315 | 4 P | 2998 0014 |
| 630 ... 1 250 | 3 / 4-pole | standard |

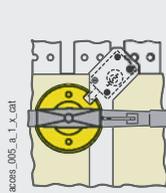
Handle key interlocking accessories

Fig. 1



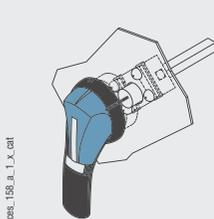
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Fig. 2



access_005_a_1_x_cat

Fig. 3



access_158_a_1_x_cat

Use

Locking in position 0 of the front operation handle:
- using a padlock (not supplied) and factory integrated into the handle. From 125 to 1250 A, the padlock on the external front operation handle also locks the door,
- using lock (not included): see diagrams opposite,
- using undervoltage coil: the SIRCO can only be closed if the coil is live.

References

Locking using RONIS EL11AP lock (not included)

| Rating (A) | No. of poles | Operation | Figure | Reference |
|---------------|--------------|----------------|--------|--------------------------|
| 125 ... 315 | 3 / 4-pole | front direct | 1 | 2699 6008 ⁽¹⁾ |
| 630 ... 1 250 | 3 / 4-pole | front direct | 2 | 2699 6027 |
| 125 ... 1 250 | 3 / 4-pole | external front | 3 | 1499 7701 |

(1) Front operation handle included.

Locking using 230 VAC undervoltage coil (other voltages: please consult us)

| Rating (A) | No. of poles | Operation | Reference |
|---------------|--------------|----------------|--------------------------|
| 125 ... 315 | 3 / 4-pole | external front | 2699 9063 ⁽¹⁾ |
| 630 ... 1 250 | 3 / 4-pole | front direct | 2699 9315 ⁽¹⁾ |

(1) The locking system is directly mounted on the switch.

Other special accessories



bd_03_04_01

- Mechanical coupling device for making switches with "n" poles of the same or different ratings.
- Mechanical interlocking device.

Enclosed switches



conf_338_a

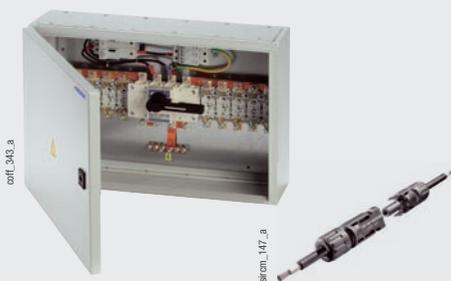
When they are not intended to be mounted in a cabinet, load break, changover or fuse protection switches are usually delivered enclosed. Located the nearest possible to the operator, they guarantee:

- protection for the inverters and PV generators against overvoltage coupling,
- disconnection under DC load between the inverters and PV generators (necessary according to the IEC 60364-712 standard).

Specialised in load break, changover and fuse protection, SOCOMEC designs and produces a large number of standard or customised enclosures. This double expertise will allow you to make use of complete systems that meet all your requirements.

Please, feel free to consult us.

Available on request



Our services are regularly sought for producing customised enclosures and panels meeting all your requirements :

- enclosures with simple load break switches,
- enclosed fuse protection switches,
- enclosed changeover switches,
- complete integrated equipment.

Available on request :

- sheet metal, insulated, varnished (seaside) or brushed stainless steel versions,
- special colours (enclosure, handle),
- customised dimensions,
- customised connections : classe II quick connectors.

For any request of customised products, please contact your SOCOMEC agency.

➔ **Characteristics according to IEC 60947-3**

SIRCO DC from 40 to 1250 A

| | | | | | | | | |
|--|-------------|--------------------|--------------------|--------------|--------------|--------------|---------------|---------------|
| Thermal current I_{th} (40° C) | 40 A | 125 A | 250 A | 315 A | 630 A | 800 A | 1000 A | 1250 A |
| Rated insulation voltage U_i (V) | 800 | 800 ⁽²⁾ | 800 ⁽²⁾ | 1000 | 1000 | 1000 | 1000 | 1000 |
| Rated impulse withstand voltage U_{imp} (kV) | 8 | 8 | 8 | 12 | 12 | 12 | 12 | 12 |

Rated operational currents I_e (A)

| Rated voltage | Load duty category | Number of poles of the device | Number of poles in series per polarity | | | | | | | | |
|---------------|--------------------|-------------------------------|--|----|-----|-----|-----|-----|-----|------|------|
| | | | | B | B | B | B | B | B | B | B |
| 220 VDC | DC-21 B | 3 | 1 | 40 | 125 | 250 | 315 | 630 | 800 | 1000 | 1250 |
| 400 VDC | DC-21 B | 4 | 2 | 40 | 125 | 200 | 250 | 630 | 800 | 1000 | 1250 |
| 600 VDC | DC-21 B | 4 | 2 | 20 | 80 | 180 | 250 | 630 | 800 | 1000 | 1250 |
| 800 VDC | DC-21 B | 4 | 2 | 20 | 63 | 125 | 250 | 630 | 800 | 1000 | 1250 |

Overload capacity

| | | | | | | | | |
|---|-----|----|----|----|----|----|-----|-----|
| Rated short-time withstand current 0.3 s. I_{sw} (kA eff.) | 2 | 15 | 17 | 25 | 50 | 50 | 100 | 100 |
| Rated short-circuit making capacity I_{cc} (kA peak) ⁽¹⁾ | 5.5 | 20 | 30 | 45 | 55 | 55 | 110 | 110 |

Connection

| | | | | | | | | |
|---|-----|----|-----|-----|------------|------------|------------|------------|
| Minimum Cu cable section (mm ²) | 2.5 | 35 | 95 | 150 | 2 x 185 | 2 x 185 | - | - |
| Minimum Cu busbar section (mm ²) | - | - | - | - | 2 x 40 x 5 | 2 x 40 x 5 | 2 x 60 x 5 | 2 x 60 x 5 |
| Maximum Cu rigid cable section (mm ²) | 16 | 50 | 150 | 240 | 2 x 300 | 2 x 300 | 4 x 185 | 4 x 185 |
| Maximum Cu busbar width (mm) | - | 25 | 32 | 40 | 63 | 63 | 100 | 100 |
| Min. tightening torque (Nm) | 2 | 9 | 20 | 20 | | | 40 | 40 |

Mechanical characteristics

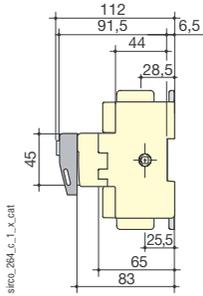
| | | | | | | | | |
|--|--------|--------|--------|-------|-------|-------|-------|-------|
| Endurance (number of operating cycles) | 20 000 | 10 000 | 10 000 | 5 000 | 3 000 | 3 000 | 4 000 | 4 000 |
| Operating effort (Nm) | - | 6.5 | 10 | 14.5 | 37 | 37 | 56 | 56 |
| Weight of 3 P switch (kg) | 0.4 | 1 | 2 | 3.5 | 8 | 8 | 12 | 12 |
| Weight of 4 P switch (kg) | 0.4 | 1.5 | 2 | 4 | 10 | 10 | 15 | 15 |

(1) For a rated operation voltage $U_n = 400$ VAC.
(2) 1000 VDC if mounted on an insulation plate.

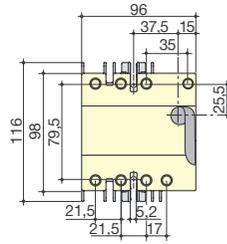
➔ SIRCO DC - Dimensions

SIRCO DC 40 A

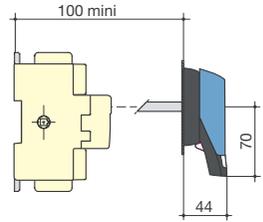
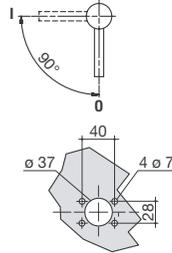
Front direct operation



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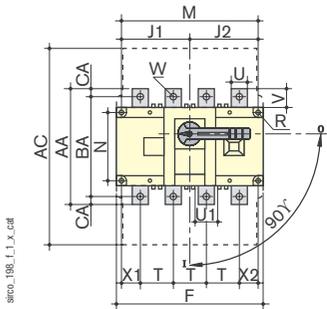


Front external operation

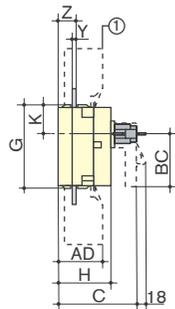


SIRCO DC from 125 to 315 A

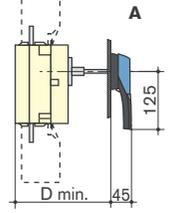
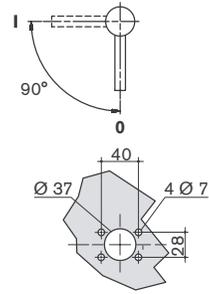
Front direct operation



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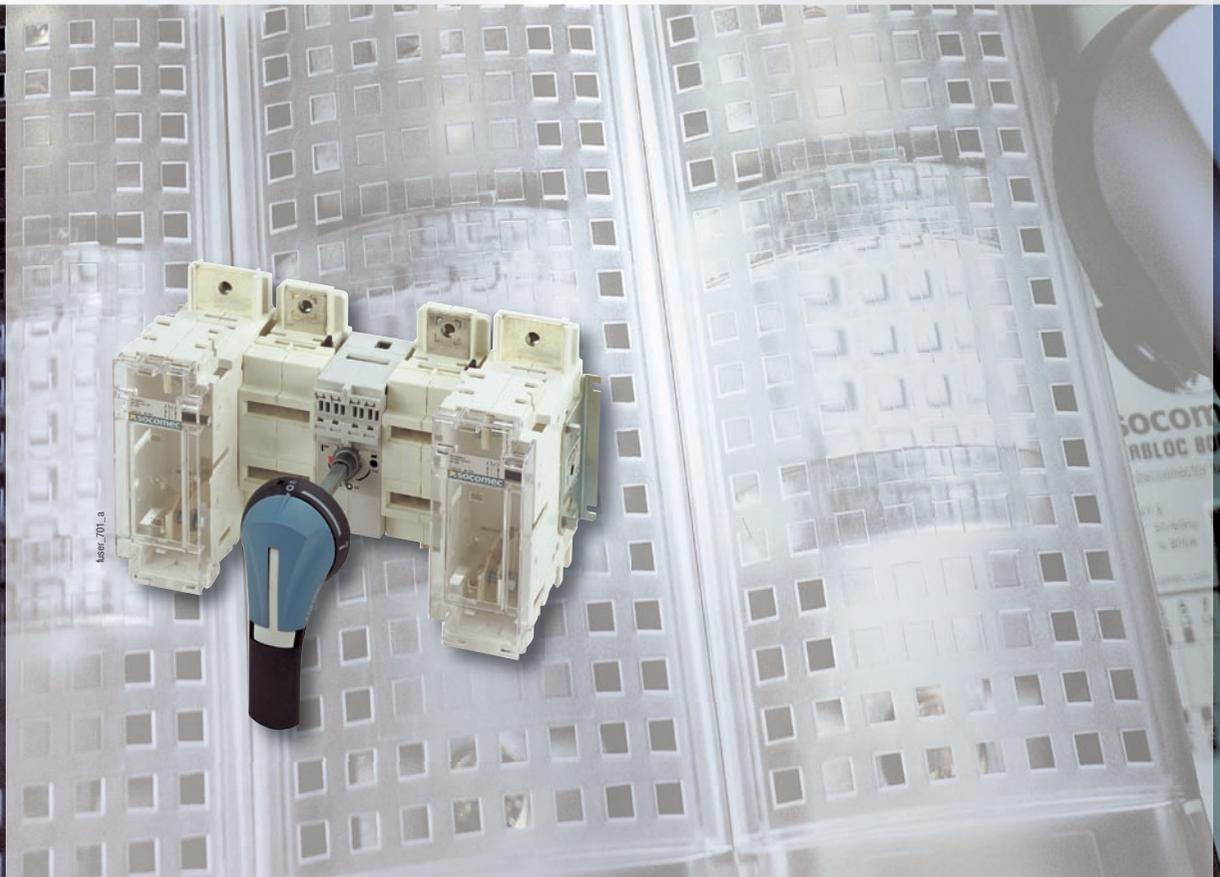


Front external operation



1. Terminal screen
S2-type handle

| Rating (A) | Overall dimensions | | Terminal shrouds | | Switch body | | | | | | | | Switch mounting | | | | Connection terminals | | | | | | | | | | | | | |
|---------------|--------------------|-------|------------------|----|-------------|-------|-----|-----|--------|--------|-----|------|-----------------|-------|-------|-----|----------------------|----|----|------|------|----|--------|--------|------|-----|------|-----|-----|----|
| | C | D min | AC | AD | F 3p. | F 4p. | G | H | J1 3p. | J1 4p. | J2 | K | BC | M 3p. | M 4p. | N | R | T | U | U1 | V | W | X1 3p. | X1 4p. | X2 | Y | Z | AA | BA | AC |
| 125 | 120 | 125 | 235 | 50 | 140 | 170 | 93 | 65 | 45 | 75 | 75 | 31.5 | 80 | 120 | 150 | 65 | 5.5 | 36 | 20 | 20.5 | 25 | 9 | 28 | 22 | 20 | 3.5 | 20.5 | 135 | 115 | 10 |
| 250 | 125 | 135 | 280 | 60 | 180 | 230 | 108 | 75 | 55 | 105 | 105 | 34 | 115 | 160 | 210 | 80 | 5.5 | 50 | 25 | 25.5 | 30 | 11 | 33 | 33 | 27 | 3.5 | 22.5 | 160 | 130 | 15 |
| 315 | 160 | 165 | 401 | 89 | 230 | 290 | 170 | 110 | 75 | 135 | 135 | 55 | 115 | 210 | 270 | 140 | 7 | 65 | 32 | 45.5 | 37.5 | 11 | 42.5 | 37.5 | 37.5 | 5 | 36 | 235 | 205 | 15 |



Manually operated fuse combination switches for PV applications

↪ Function

FUSERBLOC DC is a manually operated multipolar fuse combination switch. They break or switch off on load and provide safety isolation and protection against overcurrent for any low voltage electrical circuit.

↪ General characteristics

- Visible double breaking.
- Double break by phase (top and bottom of fuse).
- Protection against overcurrent by UR fuse circuit-breakers with high breaking capacity.
- IP2 protection with terminal shrouds.
- Up to 8 auxiliary contacts.

↪ What you need to know

- Along with the FUSERBLOC rating, the choice depends on the fuse normative and functional specifications. SOCOMEC FUSERBLOC DC must be equipped with UR 1*KN / 110 - 400 A - 1250 V. fuses
- The + and - poles of the UR fuse base are equipped with a SIDER ND breaking device. Connecting the SIDER ND in parallel increases the arc interruption capacity. The arc is thus interrupted in 8 points.

Please consult us:

- TEST position for testing control circuits without power using U type auxiliary contacts.
- FUSERBLOC DC can be configured according to your requirements. Possibility to group the breaking and the fuse modules,
- centred or offset external front operation,
- external side operation,
- other ratings.

↪ Conformity to standards

- EN 60947-3
- IEC 60947-3
- IEC 60269-1
- IEC 60269-2
- IEC 60364-4-410 (protection against electric shock)
- IEC 60364-7-712 (building electrical installations - Part 7-712 : rules for special installations or placements - Photovoltaic power supplies)

➔ References



FUSERBLOC DC

| Rating (A) fuses | No. of poles | External right-hand side or front operation switch (switch body only) | External front handle | Shaft extensions for external handle | Fuse protection covers | Auxiliary contact prebreak and position in external front operation | Terminal shrouds |
|----------------------|--------------|---|---|---------------------------------------|--|--|-------------------------|
| 250 A ⁽¹⁾ | 4 P | 38DC 1024 | Type S2 Black IP55 1421 2111 | 1400 1032 320 mm 10 x 10 | 2 P 3990 2839 ⁽²⁾ | 1 NC contact 3999 0701 1 NO contact 3999 0702 | 4 P 3998 4025 |
| | | | Black IP65 1423 2111 | 1400 1050 500 mm 10 x 10 | | | |
| | | | Red IP65 1424 2111 | | | | |

(1) Equipped with UR fuses.

(2) FUSERBLOC protection cover equipped with fuses with auxiliary contacts for fuse blown indication.

➔ Accessories

Handles and shafts

Door interlocked external operation

S2-type handle



access_150_a_1_catt

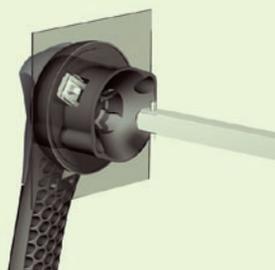
For front operation

| Rating (A) | Handle colour | Handle | external IP ⁽¹⁾ | Reference |
|------------|---------------|---------|----------------------------|---------------------------------|
| 250 | Black | Type S2 | IP55 | 1421 2111 ⁽²⁾ |
| 250 | Black | Type S2 | IP65 | 1423 2111 |
| 250 | Red | Type S2 | IP65 | 1424 2111 |

(1) IP : protection index according to the IEC 60529 standard.

(2) Standard.

Shaft guide for external operation



access_260_a_2_catt

Use

To guide the shaft extension in the external handle.
This accessory enables the handle to engage extension shaft with a misalignment of up to 15 mm.

Required for a shaft length over 320 mm.

| Description | Reference |
|-------------|------------------|
| Shaft guide | 1429 0000 |

S type handle adapter

access_197_a_1_cat



Use

Enables new S type handles to be mounted using old fixing holes.

Dimensions

Adds 12 mm to the depth.

| Handle colour | external IP ⁽¹⁾ | To be ordered in multiples of | Reference |
|---------------|----------------------------|-------------------------------|-----------|
| Black | IP65 | 10 | 1493 0000 |

(1) IP : protection index according to the IEC 60529 standard.

Alternative S-type handle cover colours

access_198_a_1_cat



Use

S2 type single lever handle
Other colours : please consult us.

| Handle colour | To be ordered in multiples of | Handle | Reference |
|---------------|-------------------------------|-------------|-----------|
| Light grey | 50 | Type S1, S2 | 1401 0001 |
| Dark grey | 50 | Type S1, S2 | 1401 0011 |

Shaft extensions for external handle

access_149_b_1_cat



Use

Standard lengths:

- 200 mm,
- 320 mm,
- 500 mm,

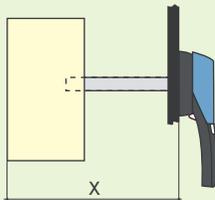
Other lengths: please consult us.

For front operation

| Rating (A) | Dimension X (mm) | Shaft length (mm) | Type | Reference |
|------------|------------------|-------------------|---------|--------------------------|
| 250 | 95 ... 230 | 200 mm | 10 x 10 | 1400 1020 |
| 250 | 95 ... 350 | 320 mm | 10 x 10 | 1400 1032 ⁽¹⁾ |
| 250 | 95 ... 530 | 500 mm | 10 x 10 | 1400 1050 |

(1) Standard.

access_202_a_1_x_cat



Other accessories

Pre-break and signalling auxiliary contact for front operation



Use
Pre-break and position 0 and I signalling,
1 to 4 NO or NC auxiliary contacts.

Connection to the control circuit
6.35 mm fast-on connection.
Electrical characteristics
30 000 operations.

| NC contact | | |
|------------|-------------|--------------------------|
| Rating (A) | AC position | Reference |
| 250 | 1 to 4 | 3999 0701 ⁽¹⁾ |

(1) For external operation.

| NO contact | | |
|------------|-------------|--------------------------|
| Rating (A) | AC position | Reference |
| 250 | 1 to 4 | 3999 0702 ⁽¹⁾ |

(1) For external operation.

Characteristics

| Rating (A) | Contact type | Nominal current (A) | Rated operational currents I _o (A) | | | |
|------------|--------------|---------------------|---|---------------|--------------|--------------|
| | | | 250 VAC AC-13 | 400 VAC AC-13 | 24 VDC DC-13 | 48 VDC DC-13 |
| 250 | NO | 10 | 6 | 4 | 5 | 3 |
| 250 | NO | 10 | 6 | 4 | 5 | 3 |

Signalling auxiliary contact for front operation - Type S



Use
Position 0 and I signalling 1 to 4 NO+NC
auxiliary contacts.

Electrical principle
The NO+NC S-type auxiliary contacts can
be configured as 2 NO or 2 NC.

Connection to the control circuit
By terminals with max. section 10 mm².

Electrical characteristics
30 000 operations.

| NO+NC contact | | |
|---------------|-------------|-----------|
| Rating (A) | AC position | Reference |
| 250 | 1 | 3999 0041 |

Characteristics

| Rating (A) | Contact type | Nominal current (A) | Rated operational currents I _o (A) | | | |
|------------|--------------|---------------------|---|---------------|--------------|--------------|
| | | | 250 VAC AC-13 | 400 VAC AC-13 | 24 VDC DC-13 | 48 VDC DC-13 |
| 250 | NO + NC | 20 | 10 | 8 | - | - |

Terminal shrouds

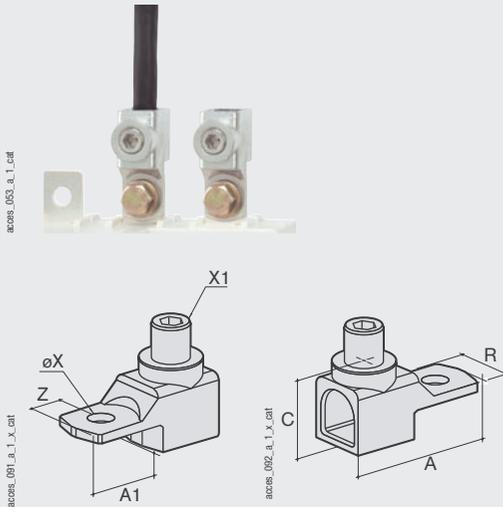


Use
Top or bottom protection against direct
contact with terminals or connection
parts.

Advantage
Perforations allowing remote
thermographic without removal.

| Rating (A) | Type | Position | Reference |
|------------|-----------------|--------------|-----------|
| 250 | Breaking module | top / bottom | 3998 4025 |

Cage terminals



Use
 Connection of bare copper cables onto the terminals (without spade lugs).

| Rating (A) | Type | Reference |
|------------|-----------------|-----------|
| 250 | Breaking module | 5400 4025 |
| 250 | Fuse module | 5400 4040 |

Connections

| Rating (A) | Cable section flexible (mm ²) | Cable section rigid (mm ²) | Width flexible bar (mm) | Stripped over (mm) |
|------------|---|--|-------------------------|--------------------|
| 250 | 16 ... 185 | 16 ... 185 | 18 | 27 |
| 250 | 50 ... 240 | 50 ... 300 | 20 | 34 |

Dimensions

| Rating (A) | A | A1 | C | R | øX | X1 | Z |
|-----------------|------|------|------|----|------|-----|----|
| Breaking module | 62 | 31,5 | 31,5 | 25 | 10,5 | M16 | 14 |
| Fuse module | 71.5 | 32 | 38 | 32 | 10.5 | M20 | 15 |

Handle key interlocking accessories

Fig. 1

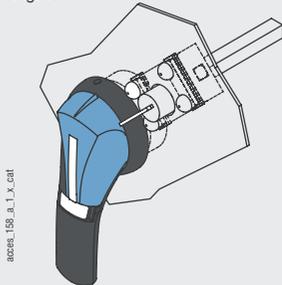
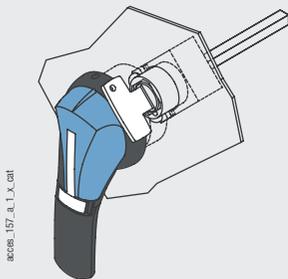


Fig. 2



Use
 Locking in position 0 of the front operation handle:
 - using RONIS EL11AP or CASTELL type K-type lock in external front operation (Fig. 1),
 - using CASTELL FS-type locks in external front operation (Fig. 2).

Locking using RONIS EL11AP lock (not included)

| Rating (A) | Operation | Figure | Reference |
|------------|----------------|--------|-----------|
| 250 | external front | 3 | 1499 7701 |

Locking using type K CASTELL lock (not included)

| Rating (A) | Operation | Figure | Reference |
|------------|----------------|--------|-----------|
| 250 | external front | 3 | 1499 7702 |

Locking using type FS CASTELL lock (not included)

| Rating (A) | Operation | Figure | Reference |
|------------|----------------|--------|-----------|
| 250 | external front | 4 | 1499 7703 |

Other special accessories



- Mechanical coupling device for making switches with "n" poles of the same or different ratings.
- Mechanical interlocking device.
- Mechanical plates and escutcheon for standard systems.

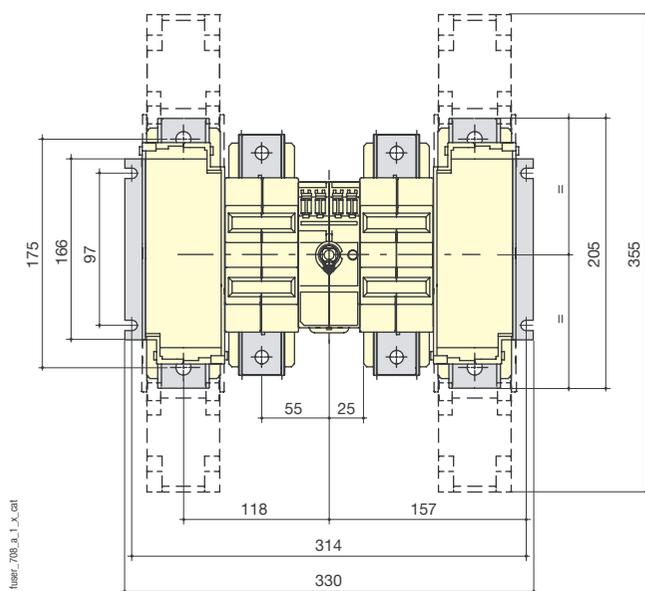
↪ **Electrical characteristics**

FUSERBLOC DC 250A characteristics

| | |
|--------------------------|--------------------------|
| Current I _{th} | 250 A |
| Rated insulation voltage | 1 000 VDC ⁽¹⁾ |
| Rated voltage | 750 VDC |
| Rated current I (A) | 120 A |
| Load duty category | DC-21 B |

(1) 1000 VDC if mounted on an insulation plate.

↪ **Dimensions**



10000_708_a_1_x_cat



Modular circuit breaker 10 x 38 for PV application

➔ Function

RM PV are modular unipolar or bipolar fuse disconnecting switches PV type cylindrical fuses 10x38. They provide safety disconnection and protection against overcurrents in any low voltage electrical photovoltaic circuit on the DC side.

RM: fuse disconnect switches without signalisation (for fuses without striker).

➔ General characteristics

- Rated voltage of 1000 VDC.
- Omnipolar and simultaneous breaking
- High dielectric strength.
- Modular DIN 45 mm cut-out.
- Self-extinguishing thermoplastic material.
- High capacity connection.

➔ Conformity to standards

- IEC 60947-3
- IEC 60269-2-1
- IEC 60269-1
- IEC 60269-2
- NF EN 60269-1
- NF C 63-210
- NF C 63211
- VDE 0636-10
- DIN 43620

➔ Approvals and certifications ⁽¹⁾

(1) Please consult us.

➔ References



RM - Device without signalisation

| No. of poles | To be ordered in multiples of | Reference |
|--------------|-------------------------------|-----------|
| 1 P | 12 | 56DC 0015 |
| 2 P | 6 | 56DC 0020 |

32 A
10 x 38

➔ Accessories

Coupling system

ACCESS_227_A_1_LCMT

Use
 To link together multiple single-pole RM

Coupling system for RM

| Rating (A) | Reference |
|------------|-----------------------------|
| 32 | 5604 0003 ⁽¹⁾⁽²⁾ |

(1) A coupling up allows to couple 2 RM/RMS
 (2) 1 reference = 1 batch of 10 coupling systems.

➔ Characteristics according to IEC 60947-3

| | |
|------------------------------------|-------------|
| Thermal current I_{th} (20° C) | 32 A |
| Fuse size | 10 x 38 |
| Rated insulation voltage U_i (V) | 1000 |

Fuse rating (A)

| | |
|-----------------|---------|
| Fuse rating (A) | 4 to 20 |
|-----------------|---------|

Rated conditional short-circuit current with gG fuse

| | |
|--|------------|
| Assumed short-circuit current (kA eff.) ⁽¹⁾ | 1.25 I_n |
|--|------------|

Design current derating coefficient for N pole side by side

| | |
|-------------|-----|
| N = 1 ... 3 | 1 |
| N = 4 ... 6 | 0.8 |
| N = 7 ... 9 | 0.7 |
| N ≥ 10 | 0.6 |

Connection

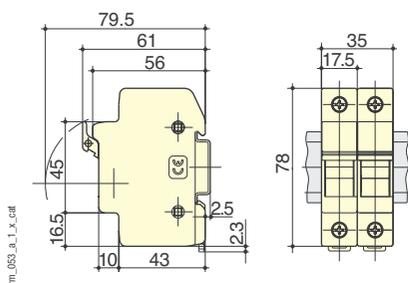
| | |
|---|---------------------------------------|
| Minimum Cu cable section (mm ²) | 4 |
| Maximum Cu rigid cable section (mm ²) | 25 ⁽²⁾ / 16 ⁽³⁾ |

Mechanical characteristics

| | |
|--------------------|-----|
| Weight of 1 P (kg) | 0.1 |
|--------------------|-----|

(1) For a rated operation voltage $U_n = 400$ VAC. - (2) Flexible cable. - (3) Rigid cable.

➔ Dimensions





PV fuses 10 x 38 gR 900 V DC for photovoltaic application

➔ Function

SOCOMEc PV fuses protect installations and people from overcurrents in any PV installation low voltage electrical circuit.

➔ Benefits

Performance

- Rated breaking capacity 30 kA under 900 V DC.
- High short-circuit limitation capacity
- Simple and reliable discrimination

Reliability

- Absolute protection over time guaranteed by the simplicity of manufacture and function (Joule effect).

Safety

- The energy given off whilst eliminating the fault is contained within the cartridge.

➔ Conformity to standards

- IEC 60947-3
- IEC 60269-1
- IEC 60269-2
- IEC 60269-2-1
- NF EN 60269-1
- NF C 63-210
- NF C 63211
- VDE 0636-10
- DIN 43620

➔ Approvals and certifications⁽¹⁾

⁽¹⁾ Please consult us.



mmme_453_a_1_cat

➤ What you need to know

When to protect?

Up to three strings in parallel, protection against overvoltage will not be necessary if the cable section is sized to withstand at least 1.25 I_{cc} (stc) of the panels.

However, starting from 4 strings, the overvoltage current, although weak, may heat up the cables and therefore, must be removed.

How to protect?

The polarities cannot be earthed, therefore, it is essential to place a fuse on each polarity of each string.

Very high voltages

In a string, several photovoltaic modules are connected in series in order to obtain the desired DC voltage. These voltages are increasingly higher.

The fuse operating voltage must be 1.15 times the no-load voltage of the panels connected in series ($1.15 \times V_{oc}$ (stc) $\times M$). Our fuses have been designed to operate up to 900 volts.

Weak overvoltage currents

As for PV panels, the short-circuit values generated in case of a fault are from two to three times the nominal current. Standard fuses are not suitable for this kind of protection and therefore, cannot be used.

These weak overvoltage values require the development of fuses capable of removing this type of fault.

Choosing the fuse rating

The fuse rating must be between 1.5 and 2 times the I_{cc} (stc) current of each string.

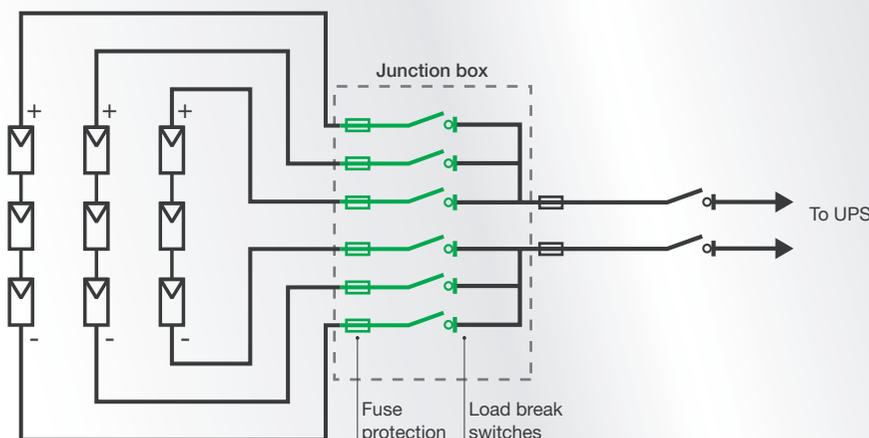
Choosing the cable

The cable must withstand a current over or equal to the cable fusing current.

Information for an effective protection

- M, number of modules in series
- N, number of strings in parallel
- I_{cc} (stc), string fault current
- V_{oc} (stc), open circuit voltage

stc: Standard Test Condition



fmsh_166_b_1_gp_cat

➤ References

PV 900 V DC fuses - Size 10 x 38

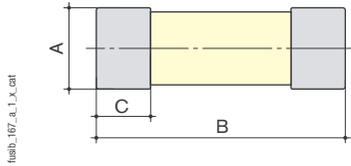


PV fuses
(in multiples
of 10)

| Rated current I (A) | Rated voltage U DC (V) | Dissipated power W at In | W at 0,8 In | Breaking capacity | I ² t pre arc (A ² s) | I ² t total 900 V (A ² s) | To be ordered in multiples of | Reference |
|---------------------|------------------------|--------------------------|-------------|-------------------|---|---|-------------------------------|-----------|
| 4 | 900 | 1.10 | 1.85 | 30 kA | 4 | 15 | 10 | 60DC 0004 |
| 6 | 900 | 1.45 | 2.50 | 30 kA | 9 | 42 | 10 | 60DC 0006 |
| 8 | 900 | 0.95 | 1.60 | 30 kA | 12 | 49 | 10 | 60DC 0008 |
| 10 | 900 | 1.25 | 2.15 | 30 kA | 19 | 69 | 10 | 60DC 0010 |
| 12 | 900 | 1.40 | 2.40 | 30 kA | 28 | 97 | 10 | 60DC 0012 |
| 16 | 900 | 1.80 | 3.10 | 30 kA | 48 | 178 | 10 | 60DC 0016 |
| 20 | 900 | 2.20 | 3.80 | 30 kA | 69 | 248 | 10 | 60DC 0020 |

➤ Normative dimensions (mm) according to IEC 60269-2-1

PV 10 x 38
without striker



| Size | Striker | A | B | C |
|---------|---------|------|----|------|
| 10 x 38 | none | 10.3 | 38 | 10.5 |



➤ Zoom



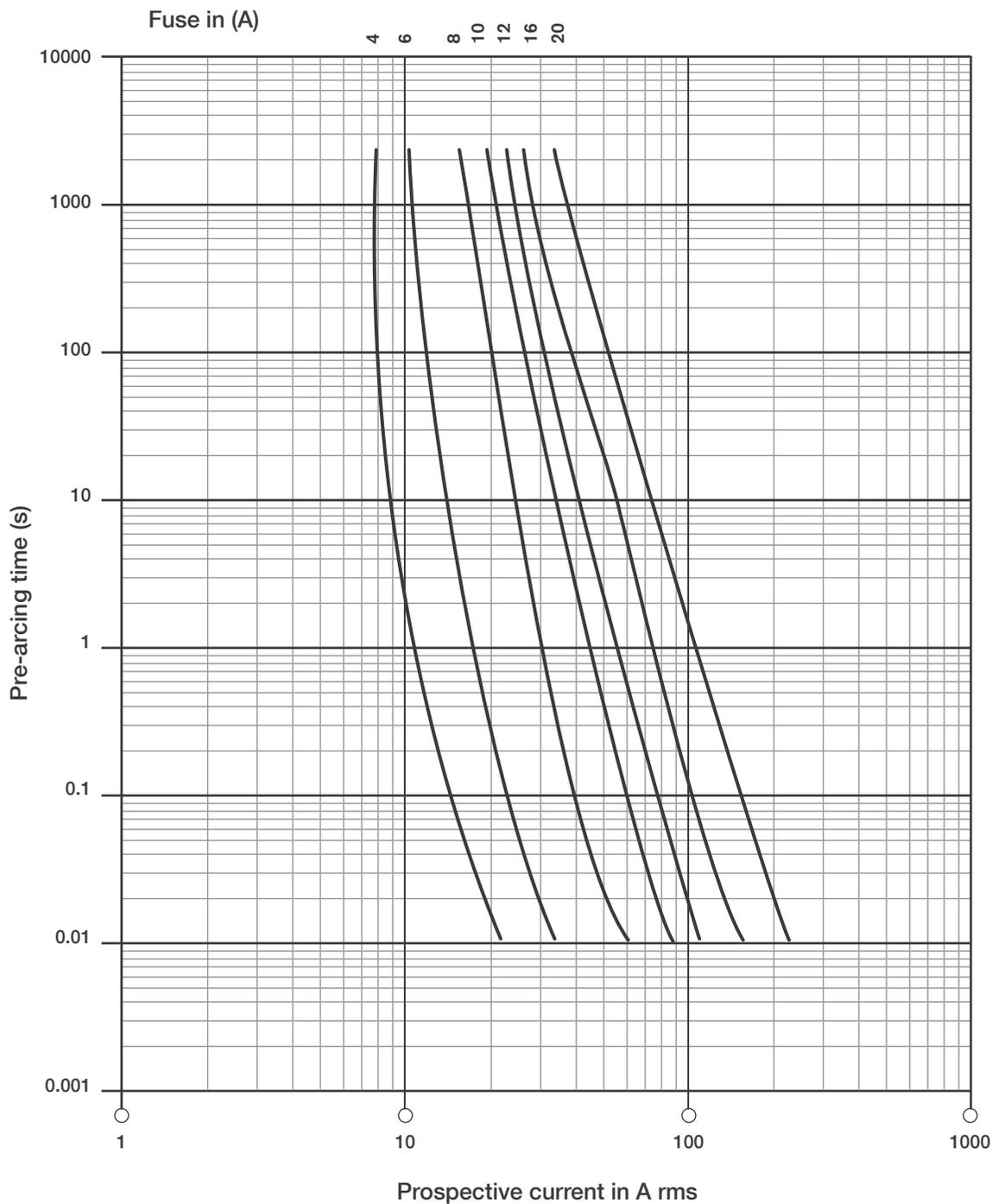
Fuse protection offers undeniable advantages in relation to the circuit-breaker in a large number of industrial applications. With an experience of over 85 years, SOCOMEC offers a range of switches and components useful for building a complete fuse protection solution.

Designing an installation with fuse protection
How to calculate a fuse protection

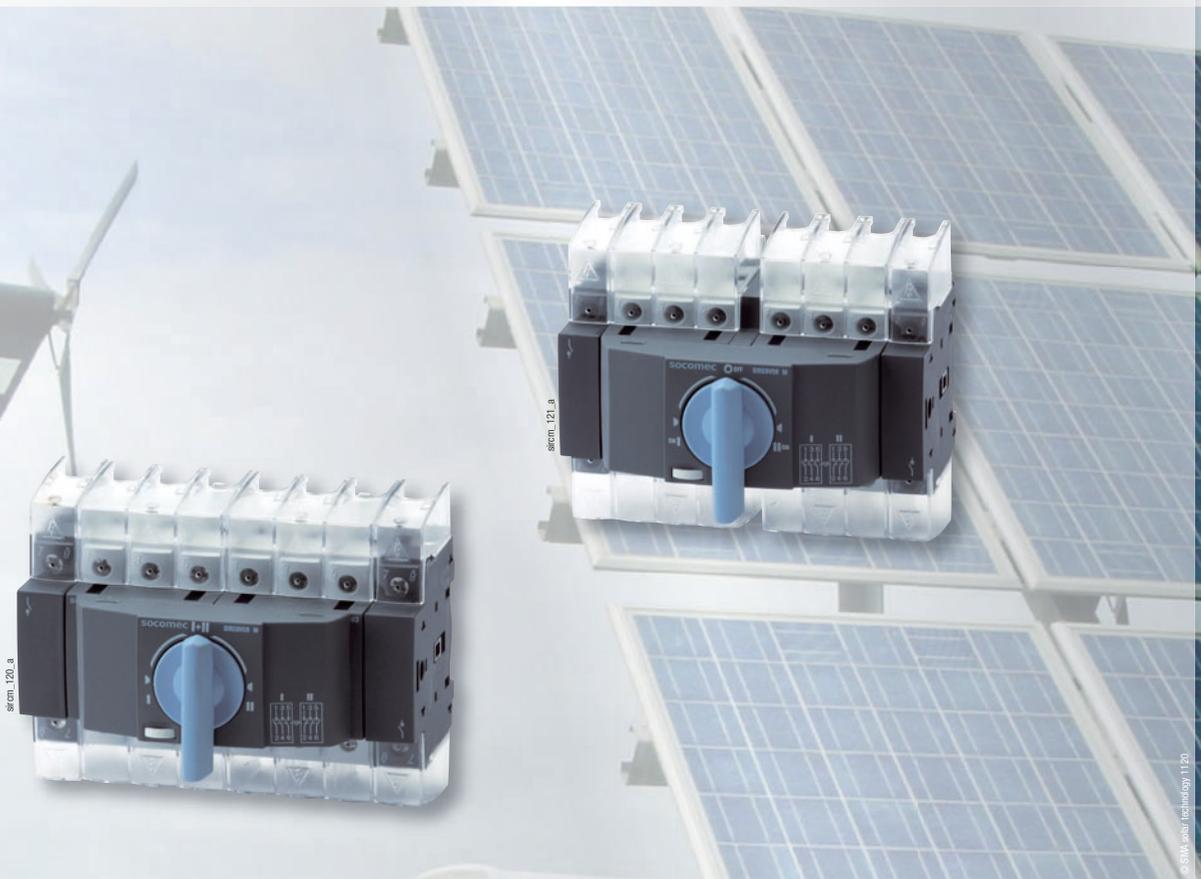
The **INSTALFUSE** software carries out sizing calculations for low-voltage installations and fuse protection. Please consult us

➔ **Characteristics of the time/current operation for PV fuses**

PV 10 x 38



fusih_165_b_2_0b_cat



Manually operated changeover switches for 40 and 80 A photovoltaic applications

➤ **Function**

SIRCOVER M DC are manually operated multipolar changeover switches. They are a combination of two SIRCOMDC load break switches and a changeover escutcheon. They provide changeover, source inversion or switching under load between two low voltage power circuits, as well as safety isolation.

➤ **General characteristic**

- Modular and modifiable device.
- Fully visible breaking.
- Double break per phase.
- DIN rail/back plate mounted or mounted on modular panel with a 45 mm front cut-out

➤ **Available on request**

- Other ratings: please consult us
- Enclosed devices: please consult us

➤ **Applications**

The choice of the material cannot be separated from the concept of energy management. The numerous applications may require continuous power supply during a PV generator fault, in case of electrification of isolated sites, in developing countries, in telecommunications or pumping. SIRCOVER M DC changeover switches ensure source inversion or switching under load between two circuits.

Example:
 Switching from DC to AC photovoltaic grid.



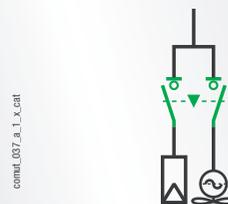
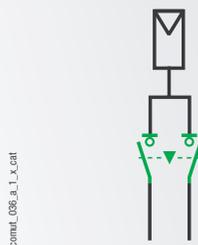
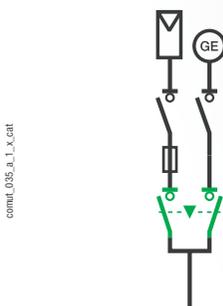
➤ **What you need to know**

Application with two interlocked switches that can be used in isolated sites.

Source tranfer, manual changeover between two photovoltaic sources or a photovoltaic source and a generator set..

Equipment earthing as for a string of photovoltaic panels.

Load inverter, switching the power supply from one load to another in order to guarantee continuous power supply during maintenance operations.



Please do not hesitate to contact us for suggestions or any special requirement: We adapt our products to your specific requirements.

References



SIRCOVER M DC

srsm_120_a

| Rating (A) | No. of poles | Switch body | Escutcheon | External front handle | Shaft extensions for external handle | 4th pole | Auxiliary contacts | Terminal shrouds |
|------------|--------------|--------------------------|---|---|--|------------------|---|--|
| 40 A | 3 P | 22DC 3004 ⁽¹⁾ | changeover I, 0, II 2209 6009 ⁽³⁾ | Type S00 I - 0 - II Black IP65 1473 1113 | 150 mm 1407 0515 200 mm 1407 0520 | 1 P 22DC 1004 | Type M 1 NO + NC auxiliary contact 2299 0001 | 1 P 2294 1005 ⁽²⁾ 3 P 2294 3005 ⁽²⁾ |
| 80 A | 3 P | 22DC 3008 | I - I+II - II 2299 6009 ⁽³⁾ | I - I+II - II Black IP65 1473 1114 | 320 mm 1407 0532 | | Type M 1 2 NC auxiliary contact 2299 0011 | 1 P 2294 1009 3 P 2294 3009 |

(1) For a 3-pole direct operation SIRCOVER M DC, you need to order 2 SIRCO M DC load break switches + a I-0-II or I-I+II - II changeover escutcheon.

(2) Top / bottom.

(3) Delivered with direct handle.

Accessories

Escutcheon



srsm_097_b_2_x_cat

Escutcheon for 3 and 4-pole changeover switches:

Use

The escutcheon allows combining two 3-pole SIRCO M DC switches (+ additional pole) in order to obtain a 3 or 4-pole front operation SIRCOVER M DC changeover switch

For SIRCOVER M DC

| Rating (A) | Type | Reference |
|------------|---------------|-----------|
| 40 ... 80 | I - 0 - II | 2209 6009 |
| 40 ... 80 | I - I+II - II | 2299 6009 |

Door interlocked external operation

S00 handle



srsm_043_a_1_x_cat

Use

Compact and robust, the new "S" type rotary handle enables the switch to be operated with a front external handle.

Front operation

| Rating (A) | Handle colour | Handle | External IP | Type | Reference |
|------------|---------------|----------|-------------|---------------|-----------|
| 40 ... 80 | Black | Type S00 | IP65 | I - 0 - II | 1473 1113 |
| 40 ... 80 | Black | Type S00 | IP65 | I - I+II - II | 1473 1114 |

Shaft extensions for external handle



srsm_045_a_2_x_cat

Use

Standard lengths:
- 150 mm,
- 200 mm,
- 320 mm,
Other lengths: please consult us.

For SIRCOVER M DC

| Rating (A) | Shaft length (mm) | Reference |
|------------|-------------------|-----------|
| 40 ... 80 | 150 | 1407 0515 |
| 40 ... 80 | 200 | 1407 0520 |
| 40 ... 80 | 320 | 1407 0532 |

Other accessories

4th pole

sircm_072_b



Use

The main poles are directly mounted on the right and on the left hand side of the 3-pole changeover switch, thus transforming it into a 4-pole switch.

For SIRCOVER M DC

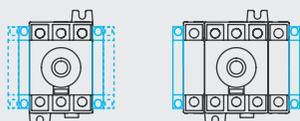
| Rating (A) | No. of poles | Type | Reference |
|------------|--------------|----------|-----------|
| 40 | 1 P | switched | 22DC 1004 |
| 80 | 1 P | switched | 22DC 1008 |

M type auxiliary contacts

sircm_075_b_2_cat



sircm_081_a_1_cat



Auxiliary contact configuration for SIRCOVER M

Use

These auxiliary contacts with pre-break and signalisation of positions 0 and I are available in NO+NC or 2 NC versions. They allow anticipating the main poles interruption. They can be mounted on the right or on the left side of the device. You can add up to 4 auxiliary contacts (2 modules).

Characteristics

NO+NC auxiliary contact: IP2 with front operation.

For SIRCOVER M DC

| Rating (A) | Contact position | Type of auxiliary contact | Reference |
|------------|------------------|---------------------------|-----------|
| 40 ... 80 | 1 AC | NO + NC | 2299 0001 |
| 40 ... 80 | 1 AC | 2 NC | 2299 0011 |

Characteristics

| Contact type | Nominal current (A) | Rated operational currents I_n (A) | |
|--------------|---------------------|--------------------------------------|-------|
| | | AC-13 | AC-15 |
| NO+NC | 10 | 10 | 6 |

Terminal shrouds

sircm_049_a_1_x_cat



Use

In batches of 2, they guarantee protection upstream and downstream against direct contact with the switch. 1 or 3-pole versions available.

Perforations allowing remote thermographic inspection without removal.

For SIRCOVER M DC

| Rating (A) | No. of poles | Position | Reference |
|------------|--------------|-----------------|-----------|
| 40 | 1 P | Top and bottom. | 2294 1005 |
| 40 | 3 P | Top and bottom. | 2294 3005 |
| 80 | 1 P | Top and bottom. | 2294 1009 |
| 80 | 3 P | Top and bottom. | 2294 3009 |

Enclosed switches

When they are not intended to be mounted in a cabinet, load break, changeover or fuse protection switches are usually delivered enclosed. Located the nearest possible to the operator, they guarantee:

- protection for the inverters and PV generators against overvoltage coupling,
- disconnection under DC load between the inverters and PV generators (necessary according to the IEC 60364-712 standard).

Specialised in load break, changeover and fuse protection, SOCOMEC designs and produces a large number of standard or customised enclosures. This double expertise will allow you to make use of complete systems that meet all your requirements.

Available on request

conf_343_a



Our services are regularly sought for producing customised enclosures and panels meeting all your requirements:

- enclosures with simple load break switches,
- enclosed fuse protection switches,
- enclosed changeover switches,
- complete integrated equipment.

For any request of customised products, please contact your SOCOMEC agency.

⇒ Characteristics according to IEC 60947-3

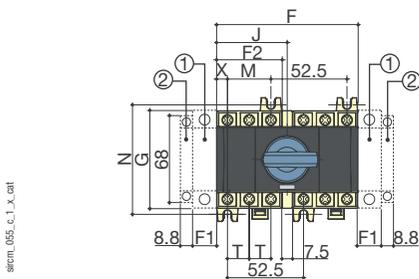
| | | | | | |
|---|--------------------|-------------------------------|--|---------|------------|
| Thermal current I_{th} 40°C | | 40 A | 80 A | | |
| Rated insulation voltage U_i (V) | | 800 | 800 | | |
| Rated impulse withstand voltage U_{imp} (kV) | | 8 | 8 | | |
| Rated operational currents I_o (A) | | | | | |
| Rated voltage | Load duty category | Number of poles of the device | Number of poles in series per polarity | B | B |
| 48 VDC | DC-21 B | 3 P | 1 P | 40 | 80 |
| 220 VDC | DC-21 B | 3 P | 1 P | 32 | 40 |
| 400 VDC | DC-21 B | 4 P | 2 P | 32 | 40 |
| 440 VDC | DC-21 B | 4 P | 2 P | 32 | 40 |
| 500 VDC | DC-21 B | 4 P | 2 P | 32 | 40 |
| Overload capacity | | | | | |
| Rated short-time withstand current 0.3 s. I_{cw} (kA eff.) | | | | 2.5 | 3 |
| Rated short-circuit making capacity I_{cc} (kA peak) ⁽¹⁾ | | | | 6 | 9 |
| Connection | | | | | |
| Minimum Cu cable section (mm ²) | | | | 1.5 | 2.5 |
| Maximum Cu cable section (mm ²) | | | | 16 | 35 |
| Tightening torque min./max.(Nm) | | | | 2 / 2.2 | 3.5 / 3.85 |
| Mechanical characteristics | | | | | |
| Endurance (number of operating cycles) | | | | 100 000 | 100 000 |
| Operating effort (Nm) | | | | 0.8 | 1 |
| Weight of 3 P switch (kg) | | | | 0.16 | 0.26 |

(1) For a rated operation voltage $U_o = 400$ VAC.

⇒ Dimensions

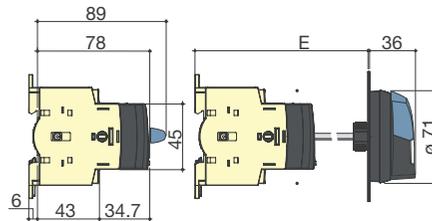
SIRCOVER M DC 40 to 80 A

Direct front operation for 3 and 4-pole changeover switches



1. Location for: 1 main pole (maximum 1 per switch) or 1 auxiliary contact.
2. Location for 1 auxiliary contact only.

External front operation for 3 and 4-pole changeover switches



Note: the total number of additional modules is maximum à 4.

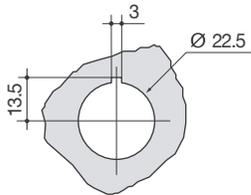
| Rating (A) | Overall dimensions | | Switch body | | | | Switch mounting | | Connection terminals | |
|------------|--------------------|-------|-------------|------|----|-------|-----------------|----|----------------------|------|
| | E min | E max | F | F1 | G | J | M | N | T | X |
| 40 | 105 | 372 | 97,5 | 15 | 68 | 48,75 | 30 | 75 | 15 | 7,5 |
| 80 | 105 | 372 | 105 | 17,5 | 76 | 52,5 | 35 | 85 | 17,5 | 8,75 |

➔ **Door drilling - S00**

SIRCOVER M DC 40 to 80 A

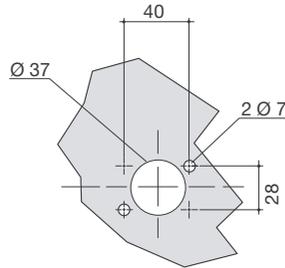
With nut mounting

srem_065_a_1_x_cat



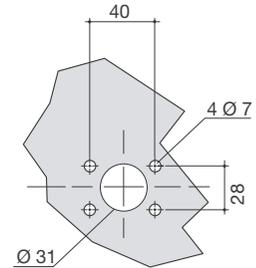
IP55 - with 2 fixing clips

srem_066_a_1_x_cat



IP65 - with 4 fixing screws

srem_067_a_1_x_cat

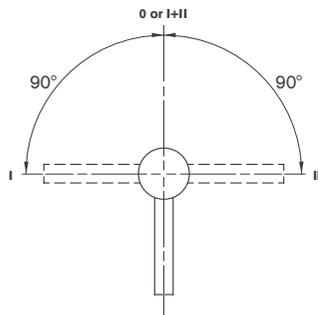


➔ **Operating handle - S00**

SIRCOVER M DC 40 to 80 A

Front operation for SIRCOVER I - 0 - II or I - I+II - II changeover switches

srem_070_b_1_dp_cat





Manually operated changeover switch for PV applications from 125 to 1250 A

➤ Function

SIRCOVER DC products are manually operated multipolar changeover switches. They ensure source inversion or changeover under load of two photovoltaic installation circuits.

➤ General characteristics

- 3 stable positions (I, 0, II) and ease to switch from one to the other under load (DC-21)
- Disconnection by fully visible breaking.
- IP20 device and accessories.

➤ What you need to know

- On models with 3 stable positions (I-0-II), SIRCOVER DC switches are available in the 3 and 4-pole versions from 125 to 1250 A. They can come in sheet steel or coffrets tôle ou polyester enclosures from 125 to 1250 A.
- SIRCOVER DC are available with direct front or external operation.

➤ Conformity to standards

- IEC 60947-3
- EN 60947-3
- VDE 0660-107 (1992)
- NBN EN 60947-3
- BS EN 60947-3

➤ Available on request

- For 6/8 pole switches
- SIRCOVER DC I-I+II-II
- SIRCOVER DC BY-PASS
- Other ratings



➤ **Application**

The choice of the material cannot be separated from the concept of energy management.

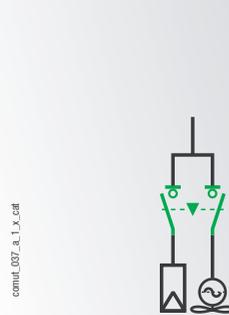
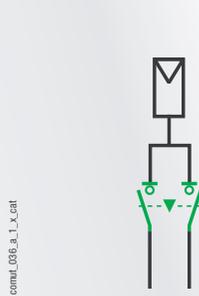
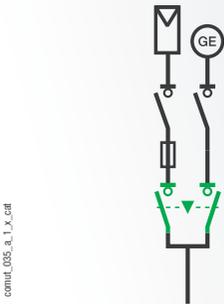
The numerous applications may require continuous power supply during a PV generator fault, in case of electrification of isolated sites, in developing countries, in telecommunications or pumping. **SIRCOVER MDC** changeover switches ensure source inversion or switching under load between two circuits.

Example:
 Switching from DC to AC photovoltaic grid.

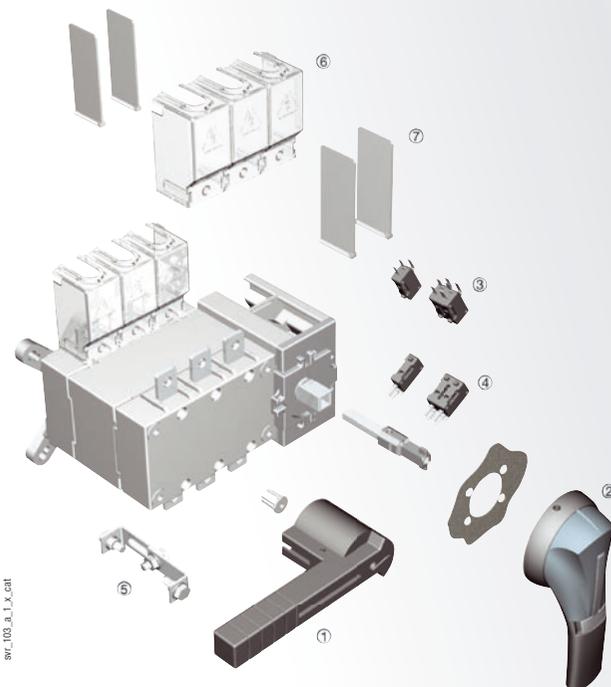
Source transfer, manual changeover between two photovoltaic sources or a photovoltaic source and a generator set.

Equipment earthing as for a string of photovoltaic panels.

Load inverter, switching the power supply from one load to another in order to guarantee continuous power supply during maintenance operations.



➤ **Principle diagram**



1. Direct front handle
2. Door interlocked external front handle.
- 3 and 4. auxiliary contacts
5. Bridging bar
6. Terminal shrouds
7. Inter phase barrier.

➔ References



SIRCOVER DC I-O-II

| Rating (A) | No. of poles | Switch body | Direct operation handle | External handle | Shaft extensions for external handle | Bridging bar. | Auxiliary contacts | Terminal shrouds | Terminal screen | | | | | | | | | | | | | | | | | | |
|------------|--------------|-------------|-----------------------------------|---|---|--|---|---|---|---|---|-----------------------------------|---|---------------------------------|---|---|---|---|---------------------------------|-----------------------------------|---|---------------------------------|---|---|------------------|---|---------------------------------|
| 125 A | 3 P | 41DC 3013 | Black 4199 5012 ⁽¹⁾ | Type S2 Black IP55 1421 2113 ⁽¹⁾ | 200 mm 1400 1020 320 mm ⁽¹⁾ | 3 P 4109 3019 | 1 st / 2 nd NO/NC auxiliary contact 4109 0021 ⁽²⁾ | 3 P 2694 3014 ⁽³⁾⁽⁴⁾ | 3 P 1509 3012 ⁽⁵⁾ | | | | | | | | | | | | | | | | | | |
| | 4 P | 41DC 4013 | | | | 4 P 4109 4019 | | 4 P 2694 4014 ⁽³⁾⁽⁴⁾ | 4 P 1509 4012 ⁽⁵⁾ | | | | | | | | | | | | | | | | | | |
| 250 A | 3 P | 41DC 3025 | | | | Black IP65 1423 2113 ⁽¹⁾ | | 1400 1032 ⁽¹⁾ | 3 P 4109 3025 | 3 P 2694 3021 ⁽³⁾⁽⁴⁾ | 3 P 1509 3025 ⁽⁵⁾ | | | | | | | | | | | | | | | | |
| | 4 P | 41DC 4025 | | | | | | | 4 P 4109 4025 | 4 P 2694 4021 ⁽³⁾⁽⁴⁾ | 4 P 1509 4025 ⁽⁵⁾ | | | | | | | | | | | | | | | | |
| 315 A | 3 P | 41DC 3032 | | | | Black 2799 7052 ⁽¹⁾ | | Type S4 Black IP65 1443 3113 ⁽¹⁾ | 200 mm 1401 1520 320 mm 1401 1532 ⁽¹⁾ | 3 P 4109 3050 | 1 st / 2 nd NO/NC auxiliary contact 4109 0021 ⁽²⁾ | 3 P 2694 3051 | 3 P 1509 3063 | | | | | | | | | | | | | | |
| | 4 P | 41DC 4032 | | | | | | | | 4 P 4109 4050 | | 4 P 2694 4051 | 4 P 1509 4063 | | | | | | | | | | | | | | |
| 630 A | 3 P | 41DC 3063 | | Black 2799 7052 ⁽¹⁾ | Type S4 Black IP65 1443 3113 ⁽¹⁾ | | | | | 200 mm 1401 1520 320 mm 1401 1532 ⁽¹⁾ | | 3 P 4109 3080 | 1 st / 2 nd NO/NC auxiliary contact 4109 0021 ⁽²⁾ | 3 P 1509 3080 ⁽⁵⁾ | | | | | | | | | | | | | |
| | 4 P | 41DC 4063 | | | | | | | | | | 4 P 4109 4080 | | | 4 P 1509 4080 ⁽⁵⁾ | | | | | | | | | | | | |
| 800 A | 3 P | 41DC 3080 | | | | | | | | | | Black 2799 7052 ⁽¹⁾ | | | Type S4 Black IP65 1443 3113 ⁽¹⁾ | 200 mm 1401 1520 320 mm 1401 1532 ⁽¹⁾ | 3 P 4109 3160 | 1 st / 2 nd NO/NC auxiliary contact 4109 0021 ⁽²⁾ | 3 P 1509 3160 ⁽⁵⁾ | | | | | | | | |
| | 4 P | 41DC 4080 | | | | | | | | | | | | | | | 4 P 4109 4160 | | | 4 P 1509 4160 ⁽⁵⁾ | | | | | | | |
| 1000 A | 3 P | 41DC 3100 | Black 2799 7052 ⁽¹⁾ | | | | Type S4 Black IP65 1443 3113 ⁽¹⁾ | | | | | | | | | | 200 mm 1401 1520 320 mm 1401 1532 ⁽¹⁾ | | | 3 P 4109 3160 | 1 st / 2 nd NO/NC auxiliary contact 4109 0021 ⁽²⁾ | 3 P 1509 3160 ⁽⁵⁾ | | | | | |
| | 4 P | 41DC 4100 | | | | | | | | | | | | | | | | | | 4 P 4109 4160 | | | 4 P 1509 4160 ⁽⁵⁾ | | | | |
| 1 250 A | 3 P | 41DC 3120 | | | | | | | | | | | | | | | | | | Black 2799 7052 ⁽¹⁾ | | | Type S4 Black IP65 1443 3113 ⁽¹⁾ | 200 mm 1401 1520 320 mm 1401 1532 ⁽¹⁾ | 3 P 4109 3160 | 1 st / 2 nd NO/NC auxiliary contact 4109 0021 ⁽²⁾ | 3 P 1509 3160 ⁽⁵⁾ |
| | 4 P | 41DC 4120 | | | | | | | | | | | | | | | | | | | | | | | 4 P 4109 4160 | | |

(1) Standard.

(2) 2 pieces: one in position I and the other in position II

(3) For an overall front, rear, top and bottom protection 4 references required.

(4) For top and bottom protection, 2 references required

(5) 2 pieces: one for top side and another for bottom side

➔ Accessories

Handles and shafts

Direct operation handle



| Rating (A) | No. of poles | Handle colour | Handle type | Reference |
|--------------|--------------|---------------|--------------|------------------|
| 125 ... 315 | 3 / 4-pole | Black | Single lever | 4199 5012 |
| 630 ... 1250 | 3 / 4-pole | Black | Single lever | 2799 7052 |

Door interlocked external operation



Use
 The door interlocked external operation includes one padlockable handle, an escutcheon and must be combined with a shaft extension.

| Rating (A) | Changeover operation type | No. of poles | external IP ⁽¹⁾ | Handle type | Reference |
|--------------|---------------------------|--------------|----------------------------|-------------|------------------|
| 125 ... 315 | I - 0 - II | 3 / 4-pole | IP55 | Type S2 | 1421 2113 |
| 125 ... 315 | I - 0 - II | 3 / 4-pole | IP65 | Type S2 | 1423 2113 |
| 630 ... 1250 | I - 0 - II | 3 / 4-pole | IP65 | Type S4 | 1443 3113 |

(1) IP: protection index according to the IEC 60529 standard.

S type handle adapter



Use
 Enables new S type handles to be mounted using old fixing holes.

Dimensions
 Adds 12 mm to the depth.

| Handle colour | external IP ⁽¹⁾ | To be ordered in multiples of | Reference |
|---------------|----------------------------|-------------------------------|------------------|
| Black | IP65 | 10 | 1493 0000 |

(1) IP: protection index according to the IEC 60529 standard.

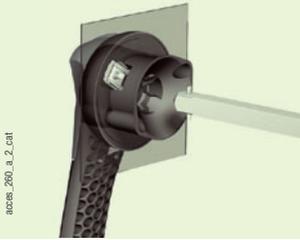
Alternative S-type handle cover colours



Use
 For S2- type single lever handles and S4-type double lever handle.
 Other colours: please consult us.

| Colour | To be ordered in multiples of | Handle | Reference |
|------------|-------------------------------|---------|------------------|
| Light grey | 50 | Type S2 | 1401 0001 |
| Dark grey | 50 | Type S2 | 1401 0011 |
| Light grey | 50 | Type S4 | 1401 0031 |
| Dark grey | 50 | Type S4 | 1401 0041 |

Shaft guide for external operation



access_260_a_2_cat

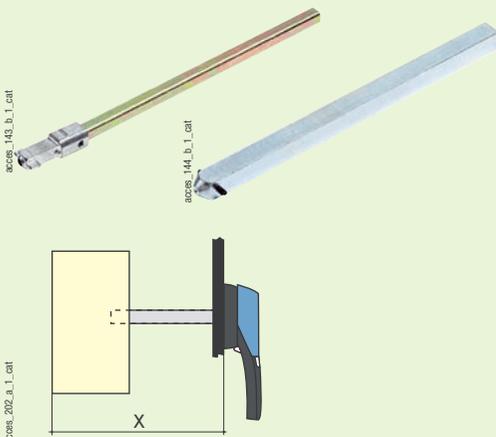
Use

To guide the shaft extension in the external handle. This accessory enables the handle to engage extension shaft with a misalignment of up to 15 mm.

Required for a shaft length over 320 mm.

| Description | Reference |
|-------------|-----------|
| Shaft guide | 1429 0000 |

Shaft extensions for external handle



access_143_b_1_cat

access_144_b_1_cat

access_202_a_1_cat

Use

Standard lengths:
 - 200 mm,
 - 320 mm,
 Other lengths: please consult us.

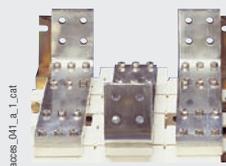
| Rating (A) | Shaft length (mm) | Dimension X (mm) | Type | Reference |
|--------------|-------------------|------------------|---------|-----------|
| 125 ... 250 | 200 | 210 ... 310 | 10 x 10 | 1400 1020 |
| 125 ... 250 | 320 | 210 ... 430 | 10 x 10 | 1400 1032 |
| 315 | 200 | 280 ... 390 | 10 x 10 | 1400 1020 |
| 315 | 320 | 280 ... 510 | 10 x 10 | 1400 1032 |
| 630 ... 1250 | 200 | 425 ... 577 | 15 x 12 | 1401 1520 |
| 630 ... 1250 | 320 | 425 ... 697 | 15 x 12 | 1401 1532 |

Other accessories

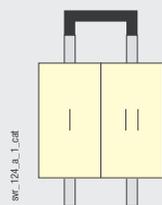
Bridging bars



access_205_a_2_cat



access_041_a_1_cat



sw_124_a_1_cat

Use

Creation of a common link, on the top or bottom side of the switch, between positions I and II.

| Rating (A) | No. of poles | Section (mm) | Mounting | Reference |
|---------------|--------------|--------------|----------|-----------|
| 125 | 1 P | 20 x 2,5 | client | 4109 0019 |
| 125 | 3 P | 20 x 2,5 | client | 4109 3019 |
| 125 | 4 P | 20 x 2,5 | client | 4109 4019 |
| 250 | 1P | 25 x 2,5 | client | 4109 0025 |
| 250 | 3 P | 25 x 2,5 | client | 4109 3025 |
| 250 | 4 P | 25 x 2,5 | client | 4109 4025 |
| 315 | 1 P | 32 x 5 | client | 4109 0050 |
| 315 | 3 P | 32 x 5 | client | 4109 3050 |
| 315 | 4 P | 32 x 5 | client | 4109 4050 |
| 630 ... 800 | 1 P | 50 x 6 | client | 4109 0080 |
| 630 ... 800 | 3 P | 50 x 6 | client | 4109 3080 |
| 630 ... 800 | 4 P | 50 x 6 | client | 4109 4080 |
| 1000 ... 1250 | 1 P | 90 x 10 | client | 4109 0160 |
| 1000 ... 1250 | 3 P | 90 x 10 | client | 4109 3160 |
| 1000 ... 1250 | 4 P | 90 x 10 | client | 4109 4160 |

Auxiliary contacts



acoss_005_a_1_cat



svr_050_a_1_cat

Use
 Pre-break and signalling of positions I and II: 1 or 2 NO/NC auxiliary contacts in each position.
 Low level auxiliary contacts: please consult us.

Connection to the control circuit
 6.35 mm fast-on connection.

Electrical characteristics
 30 000 operations.

Characteristics

| Rating (A) | Contact type | Current Nominal current (A) | Rated operational currents I _o (A) | | | |
|--------------|--------------|-----------------------------|---|---------------|--------------|--------------|
| | | | 250 VAC AC-13 | 400 VAC AC-13 | 24 VDC DC-13 | 48 VDC DC-13 |
| 125 ... 1250 | NO/NC | 16 | 12 | 8 | 14 | 6 |

changeover contact NO/NC

| Rating (A) | Contact(s) | Reference |
|--------------|-----------------------------------|-----------|
| 125 ... 1250 | 1 st / 2 nd | 4109 0021 |

Terminal shrouds



acoss_206_a_2_cat

Use
 Protection against direct contacts with terminals or connecting parts.

Advantages of the terminal shrouds
 Perforations allowing remote thermographic inspection without removal.

| Rating (A) | No. of poles | Position | Batch of | Reference |
|------------|--------------|--------------------------------------|----------|-----------------------------|
| 125 | 3 P | top / bottom / front (I) / rear (II) | 1 | 2694 3014 ⁽¹⁾⁽²⁾ |
| 125 | 4 P | top / bottom / front (I) / rear (II) | 1 | 2694 4014 ⁽¹⁾⁽²⁾ |
| 250 | 3 P | top / bottom / front (I) / rear (II) | 1 | 2694 3021 ⁽¹⁾⁽²⁾ |
| 250 | 4 P | top / bottom / front (I) / rear (II) | 1 | 2694 4021 ⁽¹⁾⁽²⁾ |
| 315 | 3 P | top / bottom / front (I) / rear (II) | 1 | 2694 3051 ⁽¹⁾⁽²⁾ |
| 315 | 4 P | top / bottom / front (I) / rear (II) | 1 | 2694 4051 ⁽¹⁾⁽²⁾ |

- (1) For an overall SIRCOVER front, rear, top and bottom protection 4 references required.
 For SIRCOVER BY-PASS 6 references required.
 (2) For an overall SIRCOVER front, rear, top and bottom protection, 2 references required.
 For SIRCOVER BY-PASS 3 references required.

Terminal screen



acoss_207_a_2_cat

Use
 Top and bottom protection against direct contacts with terminals or connecting parts.

| Rating (A) | No. of poles | Position | Batch of | Reference |
|---------------|--------------|--------------|----------|-----------|
| 125 | 3 P | top / bottom | 2 | 1509 3012 |
| 125 | 4 P | top / bottom | 2 | 1509 4012 |
| 250 | 3 P | top / bottom | 2 | 1509 3025 |
| 250 | 4 P | top / bottom | 2 | 1509 4025 |
| 315 | 3 P | top / bottom | 2 | 1509 3063 |
| 315 | 4 P | top / bottom | 2 | 1509 4063 |
| 630 ... 800 | 3 P | top / bottom | 2 | 1509 3080 |
| 630 ... 800 | 4 P | top / bottom | 2 | 1509 4080 |
| 1000 ... 1250 | 3 P | top / bottom | 2 | 1509 3160 |
| 1000 ... 1250 | 4 P | top / bottom | 2 | 1509 4160 |

Handle key interlocking accessories

Fig. 1



Fig. 3

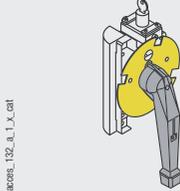


Fig. 2

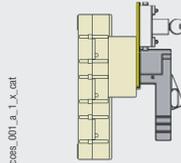
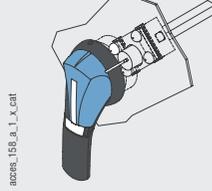


Fig. 4



Use

- Using padlock (not included). This device is factory mounted onto the direct or external operation handle and allows using up to 3 padlocks.
 - Locking:
 - using lock (not included),
 - using undervoltage coil.
- The interlocking positions are either determined as standard or configured by the user by cutting the strips.
Padlocking and locking can be combined.

Padlocking in position I, 0 or II

| Rating (A) | Operation | Figure | Reference |
|-------------|-----------|--------|-----------|
| 125 ... 315 | external | 1 | 1423 2813 |

Locking using RONIS EL11AP lock in position 0 (not included)

| Rating (A) | Operation | Figure | Reference |
|--------------|-----------|--------|--------------------------|
| 125 ... 315 | direct | 2 | 4109 1006 ⁽¹⁾ |
| 630 ... 1250 | direct | 3 | 4109 1004 ⁽²⁾ |
| 125 ... 1250 | external | 4 | 1499 7701 |

- (1) Special handle included.
(2) This locking facility can be configured by the user in the 3 positions.

Locking using RONIS EL11AP lock in positions I, 0, II (not included)

| Rating (A) | Operation | Figure | Reference |
|--------------|-----------|--------|--------------------------|
| 125 ... 315 | direct | 2 | 4109 1002 ⁽¹⁾ |
| 630 ... 1250 | direct | 3 | 4109 1004 ⁽²⁾ |
| 125 ... 315 | external | 4 | 1499 7701 |

- (1) Special handle included.
(2) This locking facility can be configured by the user in the 3 positions.

Locking using 230 VAC undervoltage coil in position 0 (factory fitted)

| Rating (A) | Operation | Figure | Reference |
|--------------|-----------|--------|-------------------|
| 630 ... 1250 | direct | 3 | please consult us |

Locking using type K CASTELL lock (not included)

| Rating (A) | Operation | Figure | Reference |
|--------------|-----------|--------|-----------|
| 125 ... 1250 | External | 4 | 1499 7702 |

Other special accessories

- Customised protection screens (for specific dimensions or high ambient temperatures).
- Inter phase barrier
- Connection accessories
- Low level auxiliary contacts



➤ **Characteristics according to IEC 60947-3**

| Thermal current I_{th} 40°C | 125 A | 250 A | 315 A | 630 A | 800 A | 1000 A | 1250 A |
|--|-------|-------|-------|-------|-------|--------|--------|
| Rated insulation voltage U_i (V) | 800 | 800 | 1000 | 1000 | 1000 | 1000 | 1000 |
| Rated impulse withstand voltage U_{imp} (kV) | 8 | 8 | 12 | 12 | 12 | 12 | 12 |

Rated operational currents I_e (A)

| Rated voltage | Load duty category | Number of poles of the device | Number of poles in series per polarity | Number of poles | | | | | | |
|---------------|--------------------|-------------------------------|--|-----------------|-----|-----|-----|-----|------|------|
| | | | | B | B | B | B | B | B | B |
| 220 VDC | DC-21 B | 3 P | 1 P | 125 | 250 | 315 | 630 | 800 | 1000 | 1250 |
| 400 VDC | DC-21 B | 4 P | 2 P | 125 | 200 | 250 | 630 | 800 | 1000 | 1250 |
| 600 VDC | DC-21 B | 4 P | 2 P | 80 | 180 | 250 | 630 | 800 | 1000 | 1250 |
| 800 VDC | DC-21 B | 4 P | 2 P | 63 | 125 | 250 | 630 | 800 | 1000 | 1250 |

Overload capacity

| | | | | | | | |
|---|----|----|----|----|----|-----|-----|
| Rated short-time withstand current 0.3 s. I_{sw} (kA eff.) | 15 | 17 | 25 | 50 | 50 | 100 | 100 |
| Rated short-circuit making capacity I_{cc} (kA peak) ⁽¹⁾ | 20 | 30 | 45 | 55 | 55 | 110 | 110 |

Connection

| | | | | | | | |
|--|----|-----|-----|------------|------------|------------|------------|
| Minimum Cu cable section (mm ²) | 35 | 95 | 150 | 2 x 185 | 2 x 185 | - | - |
| Minimum Cu busbar section (mm ²) | - | - | - | 2 x 40 x 5 | 2 x 40 x 5 | 2 x 80 x 5 | 2 x 80 x 5 |
| Maximum Cu cable section (mm ²) | 50 | 150 | 240 | 2 x 300 | 2 x 300 | 6 x 185 | 6 x 185 |
| Maximum Cu busbar width (mm) | 25 | 32 | 40 | 63 | 63 | 100 | 100 |
| Min. tightening torque (Nm) | 9 | 20 | 20 | - | - | 40 | 40 |

Mechanical characteristics

| | | | | | | | |
|---|--------|--------|-------|-------|-------|-------|-------|
| Endurance (number of operating cycles) ⁽²⁾ | 10 000 | 10 000 | 5 000 | 3 000 | 3 000 | 4 000 | 4 000 |
| Weight of 3 P switch (kg) | 1.5 | 2 | 3.5 | 17.5 | 17.5 | 34 | 34 |
| Weight of 4 P switch (kg) | 1.6 | 2.1 | 4 | 21 | 21 | 42 | 42 |

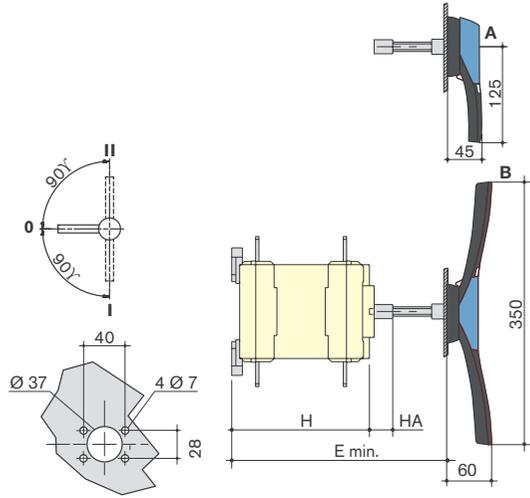
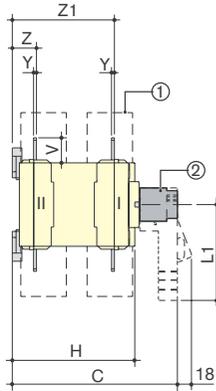
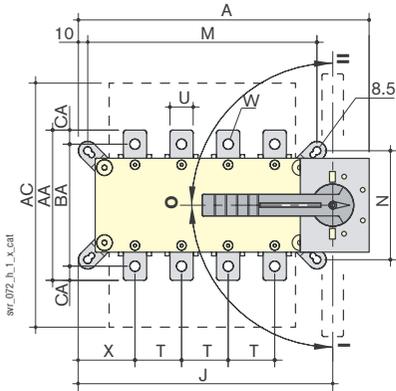
(1) For a rated operation voltage $U_e = 400$ VAC.
(2) Increased endurance: Please consult us

➔ **Dimensions**

SIRCO DC from 125 to 1250 A

Front direct operation

Front external operation



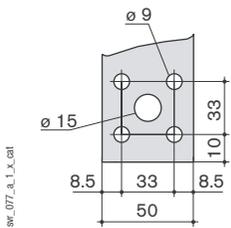
- A. S2-type handle for external operation: 125 à 315 A.
- B. S4-type handle for external operation: 630 à 1250 A.

- 1. Terminal shrouds.
- 2. Direct operation handle:
 - 125 A: L1 = 140 mm.
 - 250 to 1250 A: L1 = 210 mm.

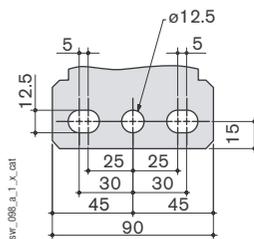
| Rating (A) | Overall dimensions | | | | Terminal shrouds AC | Switch body | | | | Switch mounting | | | Connection terminals | | | | | | | | | | | |
|------------|--------------------|-------|-----|-------------|---------------------|-------------|----|-------|-------|-----------------|-------|-----|----------------------|----|------|--------|-------|-------|-----|------|-------|-----|-----|------|
| | A 3p. | A 4p. | C | E min | | H | HA | J 3p. | J 4p. | M 3p. | M 4p. | N | T | U | V | W | X 3p. | X 4p. | Y | Z | Z1 | AA | BA | AC |
| 125 | 221 | 251 | 218 | 208 ... 436 | 235 | 148 | 25 | 182 | 212 | 156 | 186 | 101 | 36 | 20 | 25 | 8.5 | 56 | 50 | 3.5 | 28 | 124 | 135 | 115 | 10 |
| 250 | 262 | 312 | 218 | 208 ... 436 | 280 | 148 | 25 | 223 | 273 | 196 | 246 | 116 | 50 | 25 | 30 | 11 | 61 | 61 | 3.5 | 30 | 124 | 160 | 130 | 15 |
| 315 | 319 | 379 | 295 | 285 ... 513 | 401 | 225 | 25 | 272 | 332 | 246 | 306 | 176 | 65 | 32 | 37 | 13 | 70.5 | 65.5 | 5 | 43 | 180 | 235 | 205 | 15 |
| 630 | 386 | 466 | 375 | 425 ... 577 | 459 | 298 | 29 | 306.5 | 386.5 | 336 | 336 | 250 | 80 | 50 | 60.5 | 15 | 48 | 48 | 7 | 66.5 | 253.5 | 321 | - | 26.5 |
| 800 | 386 | 466 | 375 | 425 ... 577 | 459 | 298 | 29 | 306.5 | 386.5 | 336 | 336 | 250 | 80 | 50 | 60.5 | 15 | 48 | 48 | 7 | 66.5 | 253.5 | 321 | - | 26.5 |
| 1000 | 478 | 598 | 375 | 425 ... 577 | 461 | 298 | 29 | 306.5 | 388.5 | 347 | 467 | 250 | 120 | 90 | 43.5 | 12.5x5 | 54 | 54 | 8 | 66.5 | 255.5 | 288 | - | 15 |
| 1250 | 478 | 598 | 375 | 425 ... 577 | 461 | 298 | 29 | 306.5 | 388.5 | 347 | 467 | 250 | 120 | 90 | 43.5 | 12.5x5 | 54 | 54 | 8 | 66.5 | 255.5 | 288 | - | 15 |

➔ **Connection terminals**

SIRCOVER DC 630 to 800 A



SIRCOVER DC 1000 to 1250 A

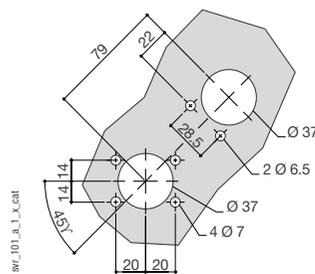
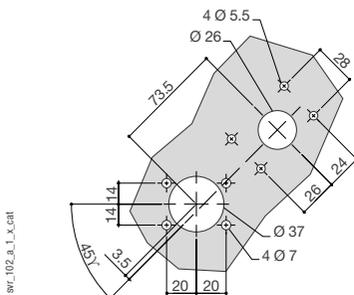


➔ **Door drilling**

SIRCOVER DC 125 to 1250 A

With RONIS EL11AP lock

With CASTELL K lock





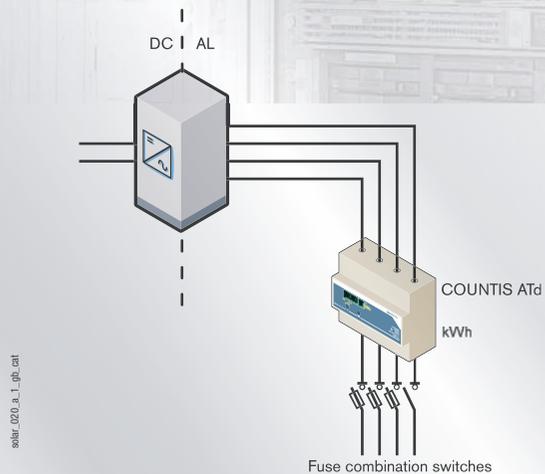
Applications

3-phase - Direct 80 A

Function

The **COUNTIS ATd** is a direct powered instrument designed for applications in sub-metering three phase active energy up to 80 A. This product is based on a principle which is unique on the market, using direct passage measurement with 3 or 4 cables (with or without neutral) or via standard connection terminals.

Passing cables through holes means that from 3 or 4 cables, 3 currents and 3 voltages can be measured and the device can be powered. Measurement of voltages and power supply are made through insulation piercing screws.

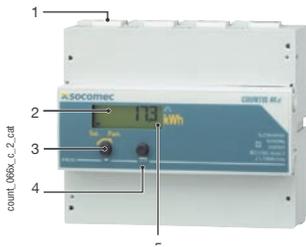


COUNTIS ATd has as standard a totalising meter allowing a direct reading of the kWh and a pulse output. A partial counter (with RESET) enables totalising of energy for specific time periods. It can be fully configured by the user via the keypad and the display (type of network, pulse duration). Furthermore, associated with a **COUNTIS Ci**, a consumption centralisation is possible via a PLC or a PC equipped with the **CONTROL VISION** software.

Conformity to standards

- IEC 61036 classe 1
- IEC 61010-1
- IEC 61000-4-2
- IEC 61000-4-3
- IEC 61000-4-4
- IEC 61000-4-5
- IEC 61000-4-6
- IEC 61000-4-8
- IEC 61000-4-11
- IEC 60068-2-6
- IEC 60669-1
- IEC 60669-2

Front panel



1. Connection of active conductors by cable passing or terminals.
2. kWh LCD display (total and partial).
3. Pushbutton for scrolling through configuration or total (Tot.) and partial (Part.) display parameters.
4. Pushbutton for configuration parameter validation.
5. Pulsed LCD indicates active consumption (10 Wh/pulse).

References

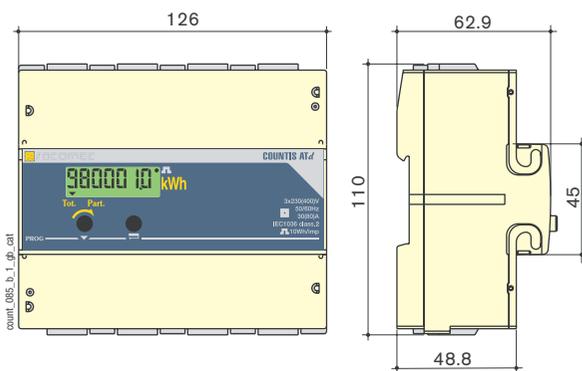
| Network voltage between phases | COUNTIS ATd Reference |
|--------------------------------|-----------------------|
| 230 VAC | 4850 0300 |
| 400 VAC | 4850 1300 |

Electrical characteristics

| Current measurement (TRMS) | |
|-----------------------------------|------------------------------|
| Type | direct |
| Measurement range | 0.8 ... 80 A |
| Input consumption | 2.5 VA |
| Sustained overload | 125 A |
| Overload | 30 I _n for 0.01 s |
| Voltage measurements (TRMS) | |
| Direct measurement between phases | 230 ± 20% / 400 ± 15% VAC |
| Input consumption | 2 VA |
| Frequency | 50 / 60 Hz |
| Energy accuracy | |
| Active (according to IEC 61036) | Class 1 |

| Auxiliary power supply | |
|---------------------------|-------------------------|
| Self-supplied | yes |
| Consumption | 2 VA |
| Output (pulsed) | |
| Number | 1 |
| Type reed relay | 100 VDC - 0.5 A - 12 VA |
| Fixed weight of impulses | 100 Wh |
| Impulse duration | 60 ... 900 ms |
| Max. number of operations | 5 x 10 ⁷ |
| Operating conditions | |
| Operating temperature: | -5 ... +45 °C |
| Storage temperature: | -20 ... +70 °C |
| Relative humidity | 85 % |

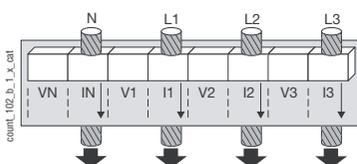
Overall dimensions



| | |
|---|----------------------------|
| Type | modular |
| Number of modules | 7 |
| Dimensions L x H x D | 126 x 110 x 62.9 mm |
| Case protection rating | IP20 |
| Front protection rating | IP40 |
| Display type | LCD |
| Terminal block type | fixed |
| Max. section of connection per cable channel | 25 mm ² |
| Max. section of connections to terminals | 50 mm ² |
| Rigid connection section of the impulse output | 1.5 ... 10 mm ² |
| Flexible connection section of the impulse output | 1 ... 6 mm ² |
| Weight | 700 g |

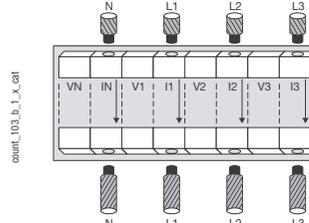
Terminals and connections

By passing the cables through



- Currents: cables pass in I1, I2, I3, and IN (if distributed neutral).
- Voltages: piercing of cable insulation through I1, I2, I3, and IN (if distributed neutral).

By cutting the cables



- Currents and voltages: connection on both sides of terminals I1, I2, I3, and IN (if distributed neutral)..



diris_501_b_1_cat

Photovoltaic network quality control and analysis

Function

DIRIS A40 is a multi-function meter for measuring electrical values in all networks. They allow starting from the front panel to configure and display all the electric parameters and to exploit the functions of measurement, metering and energy management, harmonics analysis, remote control and control state of control devices, communication and detection of high voltages, peaks and voltage disconnections.

In addition, DIRIS A40 are provided with a function for correcting connection errors.

Conformity to standards

- IEC 62053-22 class 0.5 S
- IEC 62053-23 class 2 S
- IEC 61010-1
- IEC 61000-4-2
- IEC 61000-4-3
- IEC 61000-4-4
- IEC 61000-4-5
- IEC 61000-4-6
- IEC 61000-4-8
- IEC 61000-4-11
- IEC 60068-2-6
- IEC 60068-2-11
- IEC 60068-2-30

Applications

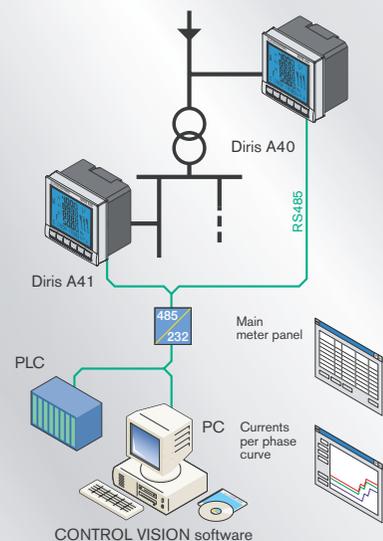
DIRIS A40, with its six direct access keys keyboard and LCD display, allows exploiting all the parameters of a LV and HV installation. These parameters can be centralised on a PC or PLC through an RS485 link using JBUS/MODBUS® protocol. The casing is designed so that the installer can easily fit the DIRIS A40 to a cabinet door. To facilitate and optimise the operator's work, DIRIS A40 use one of the most functional principles for integrating communications, metering, harmonics, analog outputs or even alarm relays. Simply fit a module on the rear of the casing to add a function.

Instantaneous average and maximum values (TRMS) of:

- currents,
- phase-to-neutral and phase-to-phase voltages,
- frequency,
- active power on 4 quadrants (±),
- reactive power on 4 quadrants (±),
- apparent power,
- Power Factor (PF),
- harmonic distortion rate (THD) up to 51 on the phase-to neutral and phase-to-phase voltages and currents.

Metering

- Active power meter on 4 quadrants.
- Reactive power meter on 4 quadrants.
- Apparent power meter
- Programmable hour run meter.



diris_501_b_1_gp_cat

Front panel



1. Backlit LCD display.
2. Pushbutton for currents and setup wiring correction
3. Pushbutton for voltages and frequency.
4. Pushbutton for active, reactive, apparent power and power factor
5. Pushbutton for maximal and average current and power values
6. Pushbutton for harmonics values
7. Pushbutton for energy and hour run meter.

Plug-in modules

DIRIS® A40



| | |
|---|--|
|  | <p>Pulse outputs</p> <p>2 configurable pulse outputs (type, weight and run) on \pm kWh, \pmkvarh and kVAh</p> |
|  | <p>Pulses and harmonics</p> <p>2 configurable pulse outputs (type, weight and run) on \pm kWh, \pmkvarh and kVAh Spectral analysis of harmonics by range and by phase for 3I, In, 3V and 3U up to range 25.</p> |
|  | <p>JBUS / MODBUS® communication</p> <p>RS485 link with JBUS / MODBUS® protocol (speed up to 38400 bauds)</p> |
|  | <p>PROFIBUS® DP communication</p> <p>RS485 link with PROFIBUS® DP protocol (speed up to 1.5 Mbauds)</p> |
|  | <p>Analogue outputs</p> <p>2 configurable outputs on 3I, In, 3V, 3U, F, $\pm$$\Sigma$P, $\pm$$\Sigma$Q, ΣS, ΣPFL/C 30 VDC power supply A maximum of 2 modules can be connected, that is 4 analogue outputs.</p> |
|  | <p>2 inputs - 2 outputs</p> <p>2 outputs assignable for the control of 3I, In, 3V, 3U, F, $\pm$$\Sigma$P, $\pm$$\Sigma$Q, XS ΣPFL/C, THD 3I, THD In, THD 3V, THD 3U and of the hour meter (storing of the 3 last alarms) or to the remote control. 2 inputs for pulses metering. 3 modules may be connected at maximum, that is 6 inputs / outputs</p> |
|  | <p>Memory</p> <ul style="list-style-type: none"> • Storing at maximum over 62 days of P+, P-, Q+, Q- with an internal or external synchronisation TOP of 5, 8, 10, 15, 20, 30 and 60 minutes • Storing of the last 10 hour-dated alarms. • Storing of the last minimal and maximal instantaneous values for 3U, 3V, 3I, In, F, ΣP\pm, ΣQ\pm, ΣS, THD 3U, THD 3V, THD, 3U, THD, 3V, THD, 3I, THD In • Storing of 10 last hour-dated EN 50160 et IEC 61000-4-30: <ul style="list-style-type: none"> - voltage dips, - over voltage, - voltage cut-off, • Storing of 3U, 3V and F average values based on synchronisation function (maximum 60 days). |

⇒ Characteristics

Current measurement on insulated inputs (TRMS)

| | |
|-----------------------------|---------------------------|
| CT primary | 10 000 A |
| CT secondary | 1 and 5 |
| Measurement range | 0 ... 11 kA |
| Input consumption | ≤ 0.1 VA |
| Measurement updating period | 1 S |
| Accuracy | 0.2 % |
| Sustained overload | 6 A |
| Intermittent overload | 10 I _n for 1 s |

Voltage measurements (TRMS)

| | |
|--|----------------------------|
| Direct measurement between phases | 18 ... 700 VAC |
| Direct measurement between phase and neutral | 11 ... 404 VAC |
| VT primary | 500 000 VAC |
| VT secondary | 60, 100, 110, 173, 190 VAC |
| Frequency | 50 / 60 Hz |
| Input consumption | ≤ 0.1 VA |
| Measurement updating period | 1 S |
| Accuracy | 0.2 % |
| Sustained overload | 760 VAC |

Current-voltage product

| | |
|----------------------|------------|
| Limitation for 1A CT | 10 000 000 |
| Limitation for 5A CT | 10 000 000 |

Power measurement

| | |
|-----------------------------|-------|
| Measurement updating period | 1 s |
| Accuracy | 0.5 % |

Power factor measurement

| | |
|-----------------------------|-------|
| Measurement updating period | 1 s |
| Accuracy | 0.5 % |

Frequency measurement

| | |
|-----------------------------|--------------|
| Measurement range | 45 ... 65 Hz |
| Measurement updating period | 1 s |
| Accuracy | 0.1 % |

Energy accuracy

| | |
|--------------------------------------|-------------|
| Active (according to IEC 62053-22) | class 0.5 S |
| Reactive (according to IEC 62053-23) | class 2 |

Auxiliary power supply

| | |
|--------------|---------------------------------|
| AC voltage | 110 ... 400 VAC |
| AC tolerance | ± 10 % |
| DC voltage | 120 ... 350 VDC / 12 ... 48 VDC |
| DC tolerance | ± 20 % / - 6 ... + 20 % |
| Frequency | 50 / 60 Hz |
| Consumption | ≤ 10 VA |

Phototransistor inputs

| | |
|-----------------------------------|-----------------|
| Number | 2 ... 6 |
| Power supply | 10 ... 30 VDC |
| Minimal signal width | 10 ms |
| Minimum length between 2 impulses | 18 ms |
| Type | phototransistor |

Outputs (alarms / control)

| | |
|------------------|-------------------------|
| Number of relays | 2 ... 6 |
| Type | 250 VDC - 5 A - 1150 VA |

Outputs (pulses)

| | |
|---------------------------|-------------------------|
| Number of relays | 2 |
| Type | 100 VDC - 0.5 A - 10 VA |
| Max. number of operations | ≤ 10 ⁹ |

Outputs (analogue)

| | |
|---------------------|-----------------|
| Number of outputs | 2 ... 4 |
| Type | Insulated |
| Range | 0 / 4 ... 20 mA |
| Charging resistance | 600 Ω |
| Maximum current | 30 mA |

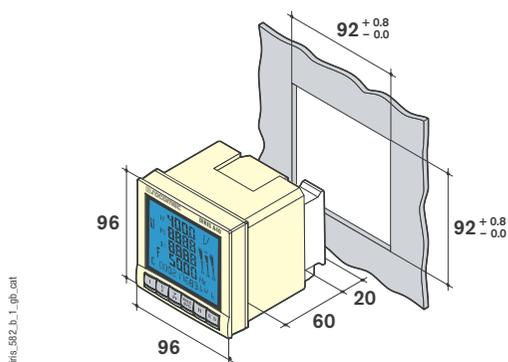
Communication

| | |
|----------------------------------|--------------------------------------|
| Link | RS485 |
| Type | 2 ... 3 half duplex wires |
| Protocol | JBUS/MODBUS [®] in RTU mode |
| JBUS / MODBUS [®] speed | 1400 ... 38400 bauds |
| Protocol | PROFIBUS [®] DP |
| PROFIBUS [®] speed | 9.8 kbauds ... 1.5 Mbauds |

Operating conditions

| | |
|------------------------|------------------|
| Operating temperature: | - 10 ... + 55 °C |
| Storage temperature: | - 20 ... + 85 °C |
| Relative humidity | 95 % |

⇒ Overall dimensions



dfis_582_b_1_gp_cat

| | |
|--------------------------------------|-----------------------------|
| Type | panel mounting |
| Dimensions H x W x D | 96 x 96 x 60 mm |
| Case protection rating | IP30 |
| Front protection rating | IP52 |
| Display type | LCD |
| Terminal block type | fixed or pull-out |
| Voltage and other connection section | 0.2 ... 2.5 mm ² |
| Current connection section | 0.5 ... 6 mm ² |
| Weight | 400 g |

➔ References

Basic device



Auxiliary power supply U_s

| | DIRIS A40 Reference |
|-----------------------------------|------------------------|
| 110 ... 400 VAC / 120 ... 350 VDC | 4825 0A40 |
| 12 ... 48 VDC | 4825 1A40 |

Optional

| Plug-in modules ⁽¹⁾ | Reference |
|------------------------------------|-----------|
| Pulse outputs | 4825 0090 |
| Pulse outputs + harmonics | 4825 0091 |
| RS485 JBUS / MODBUS® communication | 4825 0092 |
| Analogue outputs | 4825 0093 |
| 2 inputs / 2 outputs | 4825 0094 |
| RS485 PROFIBUS®DP communication | 4825 0096 |
| Memory | 4825 0097 |

Accessory description

| | Reference |
|--|-----------|
| IP65 protection cover. | 4825 0089 |
| Panel mounting kit for a 44 x 96 mm cutout | 4825 0088 |

⁽¹⁾ Ease of integration for additional functions (maximum 4) by the user at any time via clutchable modules on the rear of the device.



Permanent insulation monitoring device

Function

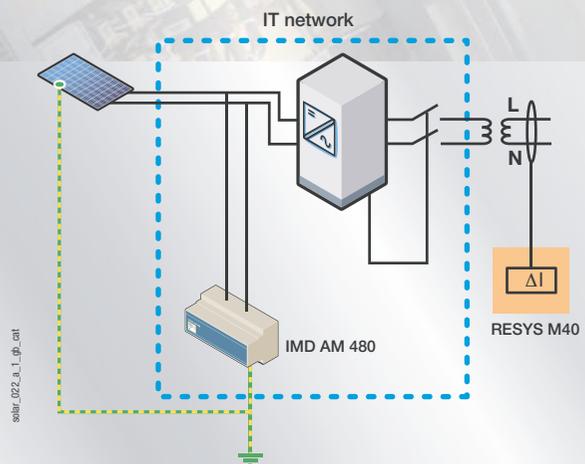
The **AM 480** insulation monitoring devices control the insulation level of isolated photovoltaic circuits. The measurement is carried out between the solar panel and inverter compound circuit and the earth circuit.

General characteristics

- Measurement by injection of a multi-frequency coded signal.
- Monitoring symmetrical DC faults.
- Led combining information regarding power on, alarms or connection failures.
- Storing the fault data or not.
- Connection self-monitoring.

Applications

Photovoltaic circuits



Note:

In compliance with the IEC 61557-8 and EN 61557-8 standards, the use of IMDs enabled to detect symmetrical faults is mandatory for low-voltage DC circuits (> 120 VDC smoothed or 140 VDC peak).

Conformity to standards

- IEC 60364
- IEC 61557-8
- EN 61557-8
- NF C 15-100
- DIN 61557-8
- VDE 0413 part 8

➔ **Front panel**



1. Led combining the indication for operation under voltage (fixed) or the occurrence of an alarm (flashing)

➔ **References**

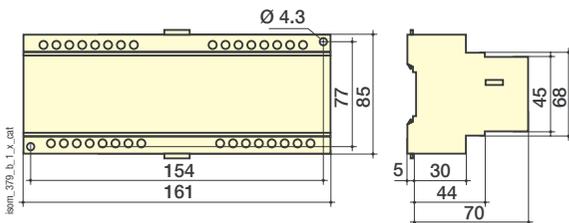
| | |
|--|------------------|
| Standard device | AM 480 |
| Auxiliary power supply U_s | Reference |
| 12 ... 84 VDC | 4724 8611 |

➔ **Electrical characteristics**

| | |
|--|--------------------|
| Network voltage U_n | |
| Maximum voltage | 1000 VDC / 800 VAC |
| Maximum three-phase circuit voltage | 828 VAC |
| Frequency | 42 ... 460 Hz |
| Rated insulation voltage | 1000 VAC |
| Maximum DC component | 1000 VAC |
| Auxiliary power supply U_s | |
| Maximum consumption | 3.5 VA |
| Fault signalling | |
| Number of thresholds | 1 |
| Type of threshold | fixed |
| Threshold value 1 | 30 k Ω |
| Maximum leakage capacity | 60 μ F |

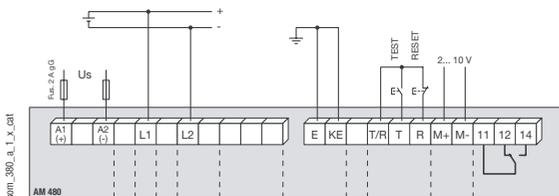
| | |
|-----------------------------|------------------|
| Output contacts | |
| Number of contacts | 1 |
| Contact type | inverter |
| DC making capacity | 1500 W |
| AC making capacity | 1250 VA |
| AC nominal voltage | 250 VAC |
| DC nominal voltage | 300 VDC |
| Continuous current | 5 A |
| Operating mode | stand-by |
| Default operating mode | stand-by |
| Operating conditions | |
| Operating temperature: | - 40 ... + 55 °C |
| Storage temperature: | - 40 ... + 70 °C |

➔ **Overall dimensions**



| | |
|-----------------------------|-----------------------------|
| Type | modular |
| Dimensions H x W x D | 161 x 85 x 75 mm |
| Case protection rating | IP30 |
| Terminal protection rating | IP20 |
| Rigid connection section | 0.2 ... 4 mm ² |
| Flexible connection section | 0.2 ... 2.5 mm ² |
| Weight | 300 g |

➔ **Terminals and connections**



- A1 - A2** : auxiliary power supply U_s
- L1 - L2** : network voltage U_n
- 11 - 12 - 14** : alarm relay output
- E - KE** : Earthing
- M+ / M-** : Isolation level remote indicator
- T** : external test pushbutton
- R** : external reset pushbutton
- T/R** : TEST and RESET combined pushbutton



Type B "variable speed drive" differential relays

➤ Function

RESYS B 420 differential relays are associated with a remote trip breaking device (automatic power cut-off), thus providing the following functions:

- protection against indirect contacts,
- limitation of leakage currents.

They also preventively monitor electrical installations via their (configurable) pre-alarm function or when used as signal relays

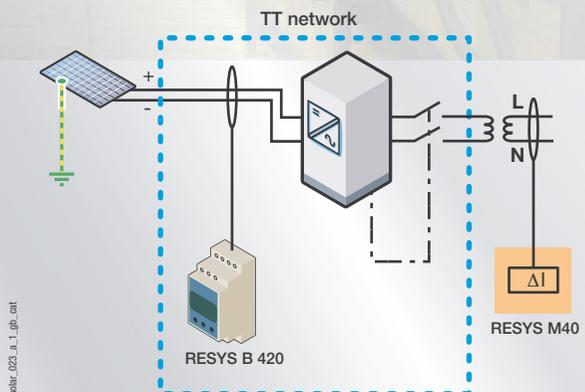
They are particularly suited to installations where continuous components disturb conventional differential devices limited to type AC or A.

Core balance transformers : see page 82.

➤ Conformity to standards

- IEC 60755
- IEC 60947-2
- IEC 62020
- IEC 60364

➤ Applications

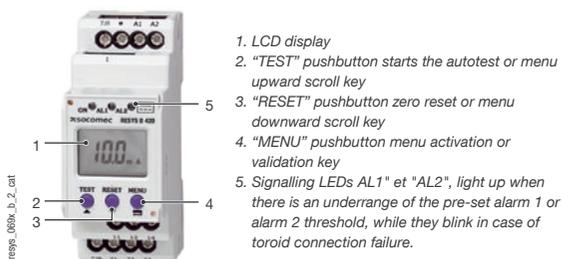


Rapid recognition of an insulation fault increases the availability of the distribution network by preventing accidental power cuts and the resulting loss of production. TRMS measurement avoids repeated random tripping and the bargraph allows the display of permanent leakage current.

➤ General characteristics

- RESYS B 420 with 2 configurable relays:
 - either 2 alarm relays,
 - or 1 alarm relay and 1 pre-alarm relay (50 % to 100 % $I_{\Delta n}$).
- Adjustment sensitivity 10 ... 500 mA.
- Time delay 0 to 10 s.
- Measurement accuracy by TRMS.
- Positive or negative security configurable by the user.
- Automatic permanent relay-toroid connection test
- Sealable cover.

Front panel



References

| Auxiliary power supply U_s | RESYS B 420 Reference |
|--------------------------------|--------------------------|
| 16 ... 72 VAC / 9.6 ... 94 VDC | 4931 4602 ⁽¹⁾ |
| 70 ... 300 VUC | 4931 4723 ⁽¹⁾ |

(1) References and characteristics of the core balance transformers : see page 82 "Core balance transformers"

Electrical characteristics

| Auxiliary power supply U_s | |
|------------------------------|---------------------|
| Frequency | 42 ... 460 Hz |
| AC operating zone | see reference table |
| DC operating zone | see reference table |
| Maximum consumption | 3 VA |

| Insulation (according to IEC 60664-1) | |
|---------------------------------------|---------|
| Rated insulation voltage | 250 VAC |
| Rated impulse voltage | 2.5 kV |
| Degree of pollution | class 3 |

| Threshold values | |
|-----------------------------------|-------------------------------|
| Setting $I_{\Delta n}$ | 10 - 500 mA |
| Accuracy of tripping | - 35 ... 100 % $I_{\Delta n}$ |
| Domain of network frequency | 0 ... 2000 Hz |
| Specified time setting | 0 - 10 s |
| PRE-ALARM relay tripping | 50 - 100 % $I_{\Delta n}$ |
| Hysteresis of the PRE-ALARM relay | 15 % $I_{\Delta n}$ |

Alarm Manual by pushbutton / using terminal

| | |
|--------------------------|---------------------------------------|
| Alarm configuration mode | memory / automatic reset |
| Alarm factory setting | memory |
| RESET | manual by pushbutton / using terminal |

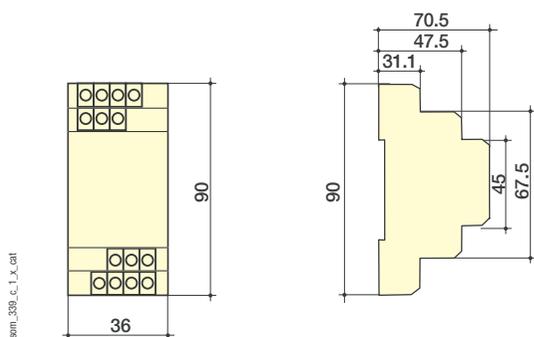
Positive security output contacts

| | |
|---|------------------------------|
| Number of contacts | 2 |
| Type of ALARM 1 contact | 230 VAC - 5 A - 1150 VA |
| Type of ALARM 2 or PREALARM contact | 230 VAC - 5 A - 1150 VA |
| ALARM 1 operating mode | positive / negative security |
| ALARM 2 or PRE-ALARM operating mode | positive / negative security |
| Factory setting of ALARM 1 operating mode | positive security |
| Factory setting of ALARM 2 operating mode | positive security |

Operating conditions

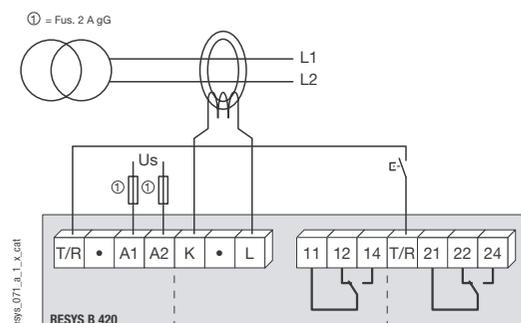
| | |
|------------------------|------------------|
| Operating temperature: | - 25 ... + 55 °C |
| Storage temperature: | - 30 ... + 70 °C |

Overall dimensions



| | |
|-----------------------------|-----------------------------|
| Type | modular |
| Number of modules | 2 |
| Dimensions H x W x D | 36 x 90 x 70.5 mm |
| Case protection rating | IP30 |
| Terminal protection rating | IP20 |
| Rigid connection section | 0.2 ... 1.5 mm ² |
| Flexible connection section | 0.2 ... 1.5 mm ² |
| Weight | 150 g |

Terminals and connections



A1 - A2 : auxiliary power supply U_s
 L1 - L2 : Network voltage U_s
 E - KE : Earthing
 T/R : External test pushbutton
 11 - 12 - 14 : Alarm relay output1
 21 - 22 - 24 : Alarm relay output 2



Type A differential relays

Function

RESYS M40 differential relays are associated with a remote trip breaking device (automatic power cut-off), thus providing the following functions:

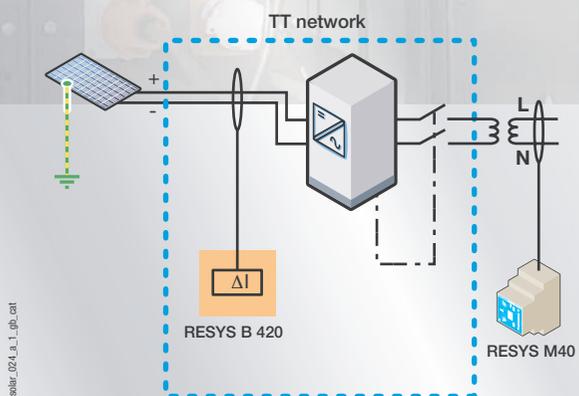
- protection against indirect contacts,
- limitation of leakage currents.

They also preventively monitor electrical installations via their (configurable) pre-alarm function or when used as signal relays

Conformity to standards

- IEC 60755
- IEC 60947-2
- IEC 62020
- IEC 60364

Applications

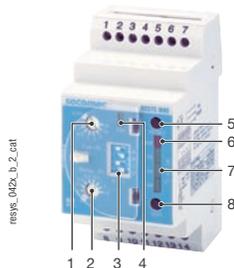


Rapid recognition of an insulation fault increases the availability of the distribution network by preventing accidental power cuts and the resulting loss of production. TRMS measurement avoids repeated random tripping and the bargraph allows the display of permanent leakage current.

General characteristics

- RESYS M40 with 2 configurable relays:
 - either 2 alarm relays,
 - or 1 alarm relay and 1 pre-alarm relay (50% to 100 % $I_{\Delta n}$).
- Adjustment sensitivity from 0.03 to 30 A.
- Time delay 0 to 10 s.
- Measurement accuracy by TRMS.
- Automatic instantaneous tripping at 30 mA.
- Positive or negative security configurable by the user.
- Selection of toroid ratio.
- Automatic permanent relay-toroid connection test
- Sealed cover.

Front panel



1. Setting $I\Delta n$
2. Time delay setting
3. Configuration micro-switches (x4).
4. "ON" Led.
5. "RESET" pushbutton
6. "TRIP" alarm LED.
7. LED bargraph (% x $I\Delta n$).
8. "TEST" pushbutton

References

| Auxiliary power supply U_s (A.N.15) | RESYS M40 Reference |
|---------------------------------------|--------------------------|
| 115 / 230 VAC | 4941 2723 ⁽¹⁾ |
| 400 VAC | 4941 2740 ⁽¹⁾ |
| 12 ... 125 VDC | 4941 2602 ⁽¹⁾ |

(1) As for references and characteristics of closed, opening and rectangular transformers, please see page 82 "Core Balance Transformers".

Electrical characteristics

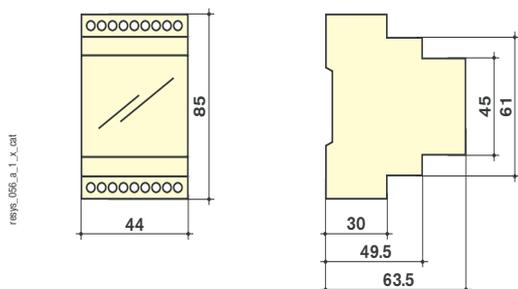
| Auxiliary power supply U_s | |
|---------------------------------------|---|
| Frequency | 47 ... 63 Hz |
| AC operating zone | 0.8 ... 1.15 U_s |
| DC operating zone | 0.8 ... 1.05 U_s |
| Maximum consumption | 6 VA (AC) / 5 W (DC) |
| Insulation (according to IEC 60664-1) | |
| Rated insulation voltage | 250 VAC |
| Rated impulse voltage | 2.5 kV (115 VAC) / 4 kV (230/400 VAC) |
| Degree of pollution | class 3 |
| Threshold values | |
| Setting $I\Delta n$ | 0.03 - 0.1 - 0.3 - 0.5 - 1 - 3 - 5 - 10 - 30 A |
| Accuracy of tripping | - 20 ... - 10 % $I\Delta n$ |
| Domain of network frequency | 15 ... 400 Hz |
| Specified time setting | 0 - 0.06 - 0.15 - 0.30 - 0.50 - 0.80 - 1 - 4 - 10 s |
| PRE-ALARM relay tripping | 50 % $I\Delta n$ |
| Hysteresis of the PRE-ALARM relay | 20 % $I\Delta n$ |

| Alarm | |
|--------------------------|---------------------------------------|
| Alarm configuration mode | memory / automatic reset |
| Alarm factory setting | memory |
| RESET | manual by pushbutton / using terminal |

| Output contacts | |
|---|------------------------------|
| Number of contacts | 2 |
| Type of ALARM 1 contact | 250 VAC - 8 A - 2000 VA |
| Type of ALARM 2 or PREALARM contact | 250 VAC - 6 A - 1500 VA |
| ALARM 1 operating mode | positive / negative security |
| ALARM 2 or PRE-ALARM operating mode | positive / negative security |
| Factory setting of ALARM 1 operating mode | negative security |
| Factory setting of ALARM 2 operating mode | positive security |

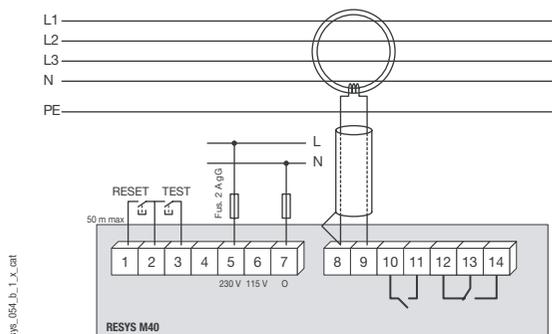
| Operating conditions | |
|------------------------|------------------|
| Operating temperature: | - 20 ... + 55 °C |
| Storage temperature: | - 30 ... + 70 °C |

Overall dimensions



| | |
|-----------------------------|-----------------------------|
| Type | modular |
| Number of modules | 2.5 |
| Dimensions H x W x D | 44 x 85 x 63.5 mm |
| Case protection rating | IP40 |
| Terminal protection rating | IP20 |
| Rigid connection section | 0.2 ... 4 mm ² |
| Flexible connection section | 0.2 ... 2.5 mm ² |
| Weight | 190 g |

Terminals and connections



- 1 - 2 - 3 : external pushbuttons
- 5 - 6 - 7 : auxiliary power supplies U_s
- 8 - 9 : SOCOMEC differential toroid connections
- 10 - 11 : alarm relay 2 or pre-alarm outputs
- 13 - 12 - 14 : alarm relay 1 outputs

NOTE : The earthing must not pass through the C.T. For single phase applications, only the live and neutral need to be passed through the C.T.
Cabling: for distances > 1 m, use twisted pair cable between the unit and C.T. Do not connect the common measure to earth .

Closed toroids



item_014_a_1_cat

Split core toroids



item_016_a_1_cat

Rectangular closed transformers



item_015_a_1_cat

Core balance transformers type A and type B

➤ Function

The installation of protection or signalling resources such as earth leakage protection relays involves the use of **core balance transformers**.

These enclose active conductors, providing the differential summation of vector currents and revealing leakage current.

The core balance transformers (toroids) proposed by SOCOMEC meet requirements in terms of measurement sensitivity and are suitable for differential relays RESYS M20/M40/P40.

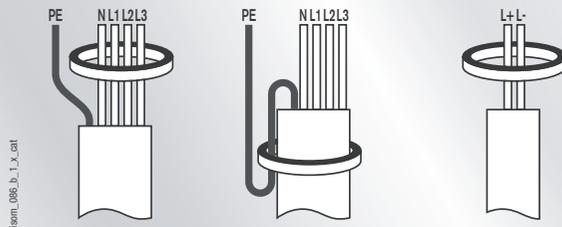
Closed (series W, WR and TFR) or opening (series WS) types, suit all wiring configurations.

A special range is proposed for RESYS B420 relays.

➤ Installation of the core transformers

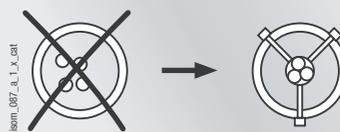
The detection toroid must be simultaneously crossed by all the active conductors. The protective conductor must necessarily pass on the outside of the toroid or pass once for each direction.

Installation of the detection toroids



item_008_b_1_x_cat

Installation limiting distortions during heavy load switching



item_007_a_1_x_cat

Example: 250 to 400 A FUSOMAT with a undervoltage coil and work mode of the negative security relay.

➤ Conformity to standards

- IEC 60044-1

➔ References



Closed toroids W series

Reference

| Type | Toroid diameter (mm) | Reference |
|---------|----------------------|--------------------------|
| W0-S15 | 15 | 4793 2001 ⁽¹⁾ |
| W1-S35 | 35 | 4793 2003 ⁽¹⁾ |
| W2-S70 | 70 | 4793 2007 ⁽¹⁾ |
| W3-S105 | 105 | 4793 2010 ⁽¹⁾ |
| W4-S140 | 140 | 4793 2014 ⁽¹⁾ |
| W5-S210 | 210 | 4793 2020 ⁽¹⁾ |

(1) Toroids for RESYS M40 relays.



Rectangular closed toroids
WR and TFR series

Reference

| Type | Toroid diameter (mm) | Reference |
|---------------|----------------------|--------------------------|
| WR 70 x 175 | 70 x 175 | 4795 0717 ⁽¹⁾ |
| WR 115 x 305 | 115 x 305 | 4795 1130 ⁽¹⁾ |
| WR 150 x 350 | 150 x 350 | 4795 1535 ⁽¹⁾ |
| TFR 200 x 500 | 200 x 500 | 4795 2050 ⁽¹⁾ |

(1) Toroids for RESYS M40 relays.



Split core toroids
WS series

Reference

| Type | Toroid diameter (mm) | Reference |
|-------------|----------------------|--------------------------|
| WS 50 x 80 | 50 x 80 | 4795 0508 ⁽¹⁾ |
| WS 80 x 80 | 80 x 80 | 4795 0808 ⁽¹⁾ |
| WS 80 x 120 | 80 x 120 | 4795 0812 ⁽¹⁾ |
| WS 80 x 160 | 80 x 160 | 4795 0816 ⁽¹⁾ |

(1) Toroids for RESYS M40 relays.



Special toroids for
RESYS B 420

Reference

| Type | Toroid diameter (mm) | Reference |
|--------|----------------------|-----------|
| W0-B20 | 20 | 4730 0020 |
| W1-B35 | 35 | 4730 0035 |
| W2-B60 | 60 | 4730 0060 |

Accessories for RESYS B420

Reference

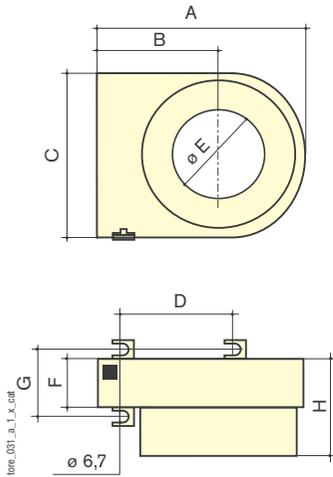
| | |
|-----------------------------|-----------|
| Connecting cable (L = 1 m) | 4930 0001 |
| Connecting cable (L = 2 m) | 4930 0002 |
| Connecting cable (L = 5 m) | 4930 0005 |
| Connecting cable (L = 10 m) | 4930 0010 |

Characteristics

| | |
|---|------------------------|
| Insulation coordination | according to IEC 664-1 |
| Rated insulation voltage | 690 VAC |
| Dielectric quality | 6 kV |
| Degree of pollution | 3 |
| Test voltage according to IEC 60255 | 3 kVAC |
| CT ratio | 600 / 1 |
| Winding resistance | ≈ 7 Ω |
| Rated primary current (W/WR/TFR/WS toroids) | 10 A |
| Rated primary current (special toroids for RESYS B470/B471) | 3 A |
| Permanent current withstand | 20 A |
| Associated thermal short-circuit current | 14 kA / 1s |
| Nominal power | 50 mVA |
| Max. accuracy index | 5 |
| Operating temperature: | -10 ... +55°C |
| Inflammability class | UL94V-0 |

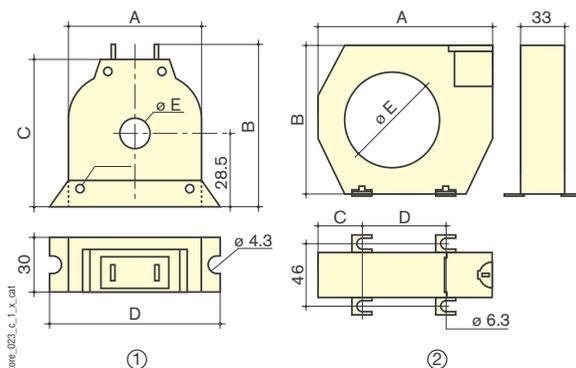
Dimensions

Special toroids for RESYS B 420



| Type | A | B | C | D | E | F | G | H | Weight (kg) |
|--------|------|----|-------|------|----|----|----|------|-------------|
| W0-B20 | 76.4 | 50 | 56.3 | 21.4 | 20 | 30 | 47 | 48.5 | 0.18 |
| W1-B35 | 99.5 | 62 | 79.2 | 49.8 | 35 | 30 | 47 | 55 | 0.35 |
| W2-B60 | 135 | 79 | 116.3 | 66 | 60 | 37 | 54 | 67 | 0.57 |

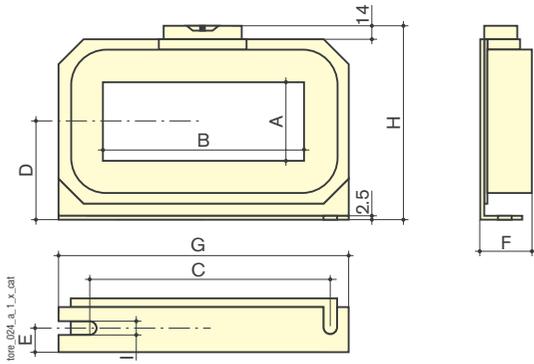
Closed toroids series W



1. W0
2. W1 to W5

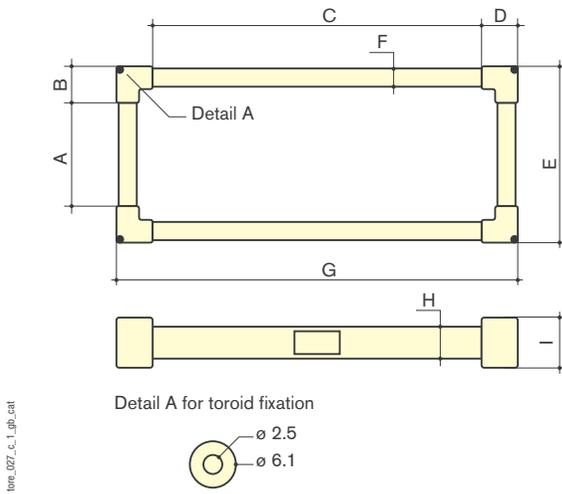
| Type | A | B | C | D | E | Weight (kg) |
|---------|------|-----|------|------|------|-------------|
| W0-S15 | 55.5 | 71 | 62 | 75 | 14.5 | 0.09 |
| W1-S35 | 100 | 79 | 26 | 48.5 | 35 | 0.25 |
| W2-S70 | 130 | 110 | 32 | 66 | 70 | 0.38 |
| W3-S105 | 170 | 146 | 38 | 94 | 105 | 0.70 |
| W4-S140 | 220 | 196 | 48.5 | 123 | 140 | 1.50 |
| W5-S210 | 229 | 284 | 69 | 161 | 210 | 2.50 |

Rectangular closed toroids WR series



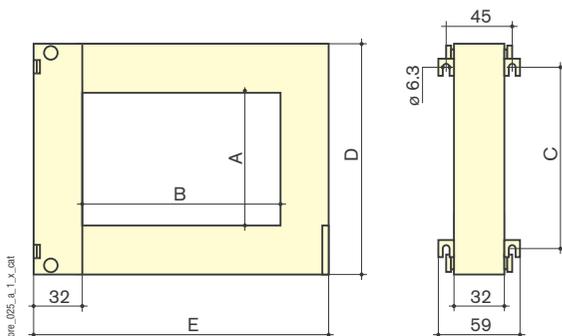
| Type | A | B | C | D | E | F | G | H | I |
|--------------|-----|-----|-----|-----|----|----|-----|-----|-----|
| WR 70 x 175 | 70 | 175 | 225 | 85 | 22 | 46 | 261 | 176 | 7.5 |
| WR 115 x 305 | 115 | 305 | 360 | 116 | 25 | 55 | 402 | 240 | 8 |
| WR 150 x 350 | 150 | 350 | 415 | 140 | 28 | 55 | 460 | 285 | 8 |

Rectangular closed toroids TFR series



| Type | A | B | C | D | E | F | G | H | I | Weight (kg) |
|---------------|-----|----|-----|----|-----|----|-----|----|----|-------------|
| TFR 200 x 500 | 159 | 48 | 460 | 48 | 239 | 26 | 540 | 40 | 76 | 7.2 |

Split core toroids WS series



| Type | A | B | C | D | E |
|-------------|----|-----|-----|-----|-----|
| WS 50 x 80 | 50 | 80 | 78 | 114 | 145 |
| WS 80 x 80 | 80 | 80 | 108 | 144 | 145 |
| WS 80 x 120 | 80 | 120 | 108 | 144 | 185 |
| WS 80 x 160 | 80 | 160 | 108 | 144 | 225 |



Type 2 "photovoltaic panels" surge arrester

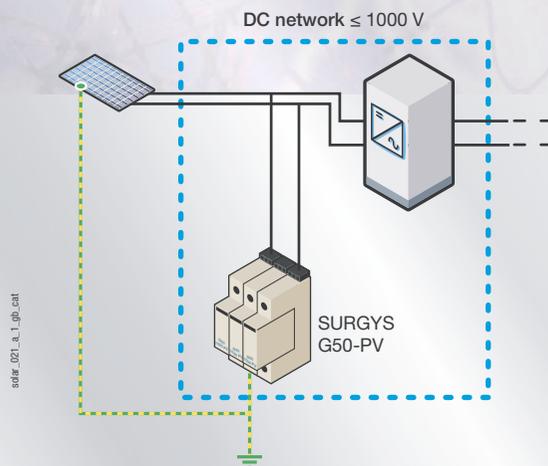
➤ Function

SURGYS® G50-PV surge protection is designed to ensure protection for photovoltaic supply networks against transient overvoltages.

➤ General characteristics

- Type 2 surge arrester.
- Available with protection to 500 VDC or 1000 VDC.
- Max. discharge current 40 kA.
- Common mode / differential mode protection
- Remote signalisation contact
- End of service life indicator.
- Pull-out module

➤ Applications

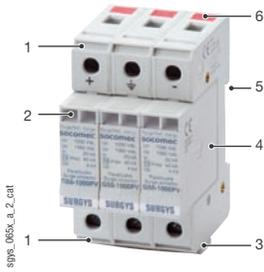


Protection at the head of the photovoltaic network : SURGYS G50-PV is installed at the level of the generator casing or enclosure, thus protecting the buildings located downstream against the indirect effects of lightning.

➤ Conformity to standards

- NF EN 61643-11 test class 2
- IEC 61643-1 class 1

➔ **Front panel**



1. Labelling
2. Location for end of service life indicator (optional)
3. Comb connection
4. Pull-out modules (500 VDC : 2 modules / 1000 VDC : 3 modules)
5. DIN-rail mounting
6. Remote signal contact

➔ **References**

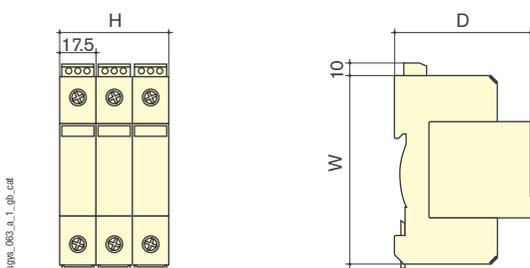
| SURGY'S® G50-PV | | | | | |
|-----------------------------|-----------------------|--------------|-----------------|---------------------------------|------------------|
| Network voltage U_n DC | Description | No. of poles | Protection mode | Number of juxtaposed casings | Reference |
| 500 | without remote signal | 2 P | MC | 2 | 4982 0500 |
| 500 | with remote signal | 2 P | MC | 2 | 4982 0501 |
| 1000 | without remote signal | 2 P | MC / MD | 3 | 4982 0520 |
| 1000 | with remote signal | 2 P | MC / MD | 3 | 4982 0521 |

➔ **Electrical characteristics**

| Network | |
|---|--|
| Type of network: | following reference |
| Nominal voltage U_n | following reference |
| Max. voltage U_m | 530 VDC (version 500V) / 1060 VDC (version 1000 V) |
| Protection characteristics | |
| Protection level U_p | 1.8 kV (500 V) / 3.6 kV (1000 V) |
| Max. discharge current (1 impulse 8/20 μ s) I_{max} | 40 kA |
| Nominal discharge current (15 impulses 8/20 μ s) I_{nmax} | 20 kA |
| Protection mode | common and differential |
| Associated characteristics | |
| Residual current I_r | < 1 mA |
| Response time t_r | < 25 ns |
| Follow-on current I_f | none |
| Short-circuit current I_{cc} | 25 kA |
| Type of disconnection indicator | mechanical |
| Number of disconnection indicator | 1 |

| Remote signal contacts | |
|--|---------------------|
| Number of contacts per pole | 1 |
| Contact type | inverter |
| AC making capacity | 3 A |
| DC making capacity | 2 A |
| AC nominal voltage | 125 VAC |
| DC nominal voltage | 30 VDC |
| Continuous current | 2 A |
| Type of connection | screw block |
| Max. section of connections to terminals | 1.5 mm ² |
| Operating conditions | |
| Operating temperature: | -40 ... +55 °C |
| Storage temperature: | -40 ... +85 °C |

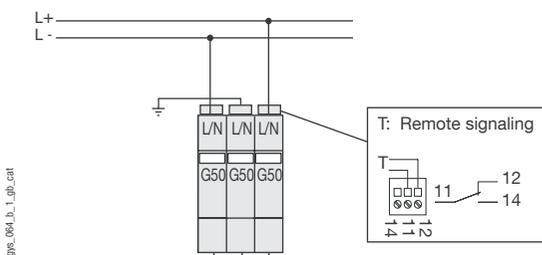
➔ **Overall dimensions**



| | |
|------------------------------|--------------------------------------|
| Type | modular |
| Dimensions H x W x D 2 poles | 35 x 90 x 67 mm (500 VDC version) |
| Dimensions H x W x D 3 poles | 52.5 x 90 x 67 mm (1000 VDC version) |
| Case protection rating | IP20 |
| Terminal protection rating | IP20 |
| Casing material | UL94-V0 thermoplastic |
| Network connection section | 4 ... 25 mm ² |
| Earthing section | 4 ... 25 mm ² |

➔ **Connection**

Common mode / differential mode protection



UPS range



Availability of high quality energy

↳ **Equipment and services for your high quality power supply**

Teams of specialised designers, highly integrated production and a dedicated commercial network have led SOCOMEC to forge the most complete ranges of high quality power supplies, industrial switching and protection components, on the market.

Marketed under the SOCOMEC UPS brand, our range of products and services meet your requirements for a quality, continuous electrical power supply. Inverters, secure power supplies, harmonic equalisers, rectifiers, DC/AC converters, covering a very wide range of applications for every sector of the market.

They have gained approval from the most demanding of users: telecoms operators, the nuclear industry, naval industry etc.

A

AC

Abbreviation of Alternating Current

ADEME

Agence De l'Environnement et de la Maîtrise de l'Energie.

French Environment and Energy Management Agency Its mission includes encouraging, supervising, coordinating, facilitating and undertaking operations with the aim of protecting the environment and managing energy.

Alternate current side (AC)

Part of the PV installation located downstream the AC terminals of the conversion equipment.

Amorphous

In chemistry an amorphous compound is a compound in which the atoms do not respect any order with average and long distance, thus distinguishing them from crystallised compounds. Glass, non-crystalline polymers and liquids are all amorphous compounds. Silicon is amorphous when not crystallised (contrary to mono or polycrystalline). This way, it can be deposited on a glass sheet.

Amorphous silicon (a-Si)

The non-crystalline form of silicon The conversion energy-efficiency of an amorphous cell is between 5 % and 8 %. The atoms in an amorphous material are spread in an uneven manner. Due to a layer thickness of only 1/2 micron, the thin layer technology is particularly inexpensive.

Amorphous solar cell

Solar cell from amorphous silicon. They are produced using the so-called thin layers technique.

Angle of incidence

The angle formed by a ray (or wave) striking a surface and a line perpendicular to the surface at the point of impact.

Anti-reflex layer

Transparent layer of just a few millionths of a millimeter, which minimises reflection losses.

The light reflecting on the cell surface cannot be absorbed and transformed into energy. Therefore, the Anti-reflex layer increases photonic conversion, thus leading to a higher efficiency of the solar cell.

B

Back contact

Type of cell where the contacts are not deposited on top of the cell active surface, but on the bottom of the module. This method has two advantages: A homogeneous cell aspect, facilitating the aesthetic integration of the modules and the absence of metal tracks, thus increasing the cell energy-efficiency.

Balance of System (BOS)

See "Other components of the system".

BIPV (Building Integrated Photovoltaics)

Building Integrated PhotoVoltaics referring to the photovoltaic elements that are integrative part of a building and have a double function: electrical energy production and architectural element.

Bottom of the module

Rear part of the modules where the cells are located, which can be made from various materials, such as PVF or glass.

Bridge

Changeover for converting DC in AC. A bridge is composed of transistors, capacities and inductances and, when needed, of a step-up substation (versions without transformer) or an output transformer for the versions with transformers.

Building integration

Regards the eligibility of a building to its integration in order to obtain the purchase (55 cts/€ per Kw/h) by the electricity company for a photovoltaic installation. (roof, curtain wall, glass roof and balcony integration).

BY-PASS diode

A diode mounted in parallel which, in case of shadowing on a row of cells (if connected in series), the current is short-circuited to the concerned cell. Hot spot.

C

Cell features

To obtain these cells, all you need to do is connect a load (resistance) between its terminals so that its values varies from zero to infinity. By measuring current I and voltage V at the cell terminals, we obtain a curve I (V) for a determined temperature and radiation. Voc [V] : Open circuit voltage when the load is infinite.

Isc [A] : Short circuit current with zero-load. Knowing that the power is given by the the product of the current and voltage, we obtain the P (V) power curve in function of the voltage, when the load varies from zero to infinity. As we can see, for a constant temperature and radiation there is a voltage value (therefore a load) where the cell provides maximum power.

At this point, the MPP (Maximum Power Point), the cell energy-efficiency is at its maximum.

COM-Card

Communication connectors between converters, including including datalogger.

Connection contract

Document defining the procedure, managed by the distributor, for connecting electricity-producing installations to the public electric network.

Conversion energy-efficiency

Relationship between the electric power supplied by a PV component and the solar power received by the latter. E.g., if a square cell with a 0.1 m side receives an irradiance of 1000 W/m² (a typical global radiation value) and supplies an electric power of 1.2 W, its conversion energy-efficiency will be: $1.2 \text{ W} / (1000 \text{ W/m}^2 \times 0.01 \text{ m}^2) = 12 \%$. It is important to distinguish intrinsic conversion energy-efficiency of the used semiconductor material and that of the PV modules (which also depends on the relationship between the panel active surface and its overall surface).

COP (Coefficient of performance)

Energy performance of a heat pump is defined by the relationship between the quantity of heat produced by the latter and the electric energy consumed by the compressor. This ratio defines the Coefficient of Performance (COP)

Crystalline (mono or poly)

Silicon in the form of crystals for manufacturing photovoltaic cells. See also "Crystalline solar cells".

Crystalline solar cell

The most widespread photovoltaic technology (approximately 93% of the market). The cell is the basic element of photovoltaic generation. It is composed by a "wafer", i.e., a very thin block of silicon. Silicon is a semiconductor material, which converts solar radiation into electrical energy. It can be monocrystalline and polycrystalline.

D

Datalogger

Electronic device for recording and storing the experiment measures.

DC

Abbreviation for Direct Current

Degradation (power loss)

This effect appears with amorphous silicon cells. After approximately 1.000 hours of sunlight, the power stabilises at the level of the nominal power displayed by the manufacturer.

DIDEME

Demand and Energy Markets. Department Its role is to ensure the proper functioning and to define the public service gas and electric policy, as well as to monitor the renewable energy market, to layout a regulation and deal with the statutory problems of these enterprises.

Direct current side (DC)

Part of the PV installation located between the PV modules and the DC terminals of the PV conversion equipment.

Direct solar radiation

Solar radiation reaching the Earth directly from the solar disc.

Distance mounting

PV module field mounting technique on sloping roofs, according to which a gap is left between the modules and the roof, inclining the modules to the optimal angle.

Dumpload

In case of energy surplus, consumers connected spontaneously can be used to balance significant fluctuating loads. From an energy point of view, the best suited consumers are those with storage means (well pumps, refrigeration equipment, boilers). However, for a strictly technical function, a load resistance will suffice.

E

Easement

Legal agreement, whether verbal or written, defining an interest in exclusive or common use of a private property or of the airspace above it. The "right of way" is the concept whereby an electricity public service can install electric lines on private property is a type of easement. (See also "Restrictive clause".)

Encapsulation

Glass or plastic coating of PV panels for the protection of the cells.

Energy management material

Electrical equipment used to convert energy generated by the PV modules into usable energy. Collective term referring to the inverter, the converter, the battery charge regulator and the bypass diode. **Energy payback time**
See "EPBT".

Energy Payback Time (EPBT)

The energy payback time is the number of years taken for a complete photovoltaic system (modules, cables and electronic devices) to be compensated by the energy production.

Energy Return Factor (ERF)

The Energy Return Factor is the ratio of the energy produced by a photovoltaic installation during its service life and the energy invested in its manufacturing.

ENS

Abbreviation for "facility for net monitoring with an assigned switch in series", in French "Équipement de surveillance de Réseau avec Sectionneur assigné". Part of a "automatic disconnection switch for self-generation installations". It is a device required for safety reasons, which prevents the continued injection of solar energy in an external grid in case of network shutdown.

EVA

EVA is the abbreviation of ethylene vinyl acetate. This plastic resin is used for the encapsulation of the PV cells by lamination.

F

Factor 4

Aim to cut by a factor four the emissions of greenhouse gases of industrialised countries by 2050 compared to 1990, in order to limit the Earth warming to 2°C.

Final yield (Yf)

The final yield is defined as the relationship between the usable energy (at the inverter output, when present) produced by an installation over a given period and the nominal power of said installation. The final yield is measured in [kWh/kWp].

Frame

External part of the modules for the protection of said modules and their fixation.

G

Galvanic separation

Interruption of a direct electrical connection, for example via a transformer. During this process, electrical energy is converted into magnetic energy, and then reconverted in electrical energy.

Global solar irradiance and radiation (W/m²)

Solar irradiance is the solar power per unit surface, measured in [W/m²], on a determined surface (position and orientation). The global solar radiation is the total of direct solar radiation received on Earth and measured on the horizontal plane.

Grid-connection

Connection of a photovoltaic installation to the public electric grid in order to sell all or part of the electric production.

Grid-connected system

A system that is connected to the grid in order to be powered or used as an energy source (primary or secondary).

Grid, contacts

PV panel metal grid which allows the series or parallel connection of the cells.

H

Heliotrope system

Special support system, thanks to which the solar panel orientation continuously follows the solar phase, so that the solar radiation always falls vertically on the cells.

HESPUL (formerly Phebuis)

Association which aims at developing energy-efficiency as well as renewable energies.

Horsepower (HP)

The imperial (British) unit of power equal to 746 watts.

Hot spot.

Hot spots result from shadowing in a single solar cell. In a panel, the cells are connected in series to form a row. A shadowed cell behaves like an electrical resistance and could be destroyed by heat if the power of other cells passes through. To prevent this, bypass diodes are installed parallel to these cells.

I

I-V curve

The "Current (I) Voltage (V)" curve represents the typical behaviour of a solar cell. See also "Cell features".

Inverter

A device that converts the direct current produced by the PV panels to alternating current. This device is necessary for connecting the PV system to the electric distribution network.

Inverter without transformer

Inverter without network transformer with very high energy-efficiency.

Isolated or stand alone system

A system that is not connected to an electric network and operates independently via a battery system.

K

Kilowatt-hour (kWh)

Energy unit equal to the work done in an hour by a machine with 1000 watts of power (1000 W) > 1 MW/h = 1000 kWh.

Kyoto Protocol

Ratified in 1997, The Kyoto Protocol is an international agreement that aims at tackling climate change by reducing GHG emissions, responsible for global warming.

L

Load

All that, in an electric circuit, draws energy from the circuit when powered (lamps, appliances, tools, pumps, etc.).

M

Maximum Power Point (MPP)

Abbreviation: MPP. The point in the current-voltage (I-V) curve in which the maximum power of solar cell can be withdrawn. This point can be found and used for each function thanks to MPP-Tracking. See also "Cell features".

Meter

Mechanical or electronic device for measuring the produced and/or consumed energy

Minimum power

Equal to the nominal power minus the tolerance margins.

Monocrystalline

When cooled, molten silicon solidifies forming a single large-sized crystal. This crystal is cut into small pieces to obtain photovoltaic cells. Monocrystalline is distinguished by a regular sequence of atoms, which spread across the the entire block of material. The energy-efficiency of monocrystalline solar cells is higher than that of polycrystalline silicon cells.

Monocrystalline silicon

Name for silicon in the form of a single crystal. The conversion energy-efficiency of a monocrystalline cell is between 15 and 22 %.

MPP-Tracking

Regulation of the the released power so that the photovoltaic system is continuously operated in MPP mode. This allows preventing electrical energy losses. It is an integrative component of a regulator and a converter.

Multi-String Inverter

This type of inverter has both the advantages of various strings (separated MPP regulation of several individual strings) a of a central inverter (lower specific power costs).

O

Open circuit voltage

Voltage present in a photovoltaic cell exposed to maximum sunlight, in a no-load condition; Maximum voltage possible.

Other components of the system

Components of a photovoltaic system other than modules and batteries. They include switches, controllers, meters, energy management material, solar tracking devices and the structure supporting the photovoltaic modules field

P

Parallel connection

Method for interconnecting electricity-producing or electricity-consuming devices, according to which, the produced or required voltage remains constant while the device current increases. Opposite of "series connection".

Peak megawatt (Mwc)

Peak Watt is the unit of measurement of the power of a photovoltaic system per time unit.

Peak or nominal power Watt Peak (Wp)

Nominal power of a photovoltaic device in STC, i.e., "Standard Test Conditions" (irradiance of 1000W/m² and temperature of 25°C). The peak or nominal power is expressed in "Watt-peak" [Wp].

Peak power

Maximum or optimal power (expressed in Wc) released by a photovoltaic cell in STC (Standard Test Conditions) under an illumination of 1 kW/m² and a junction temperature of 25°C.

Performance ratio (PR)

The performance ratio is defined as the relationship between final yield Yf and target yield Yr (energy theoretically available per installed kWp, in [kWh/kWp]), over the same period. The performance ratio is measured in [%].

Photovoltaics (abbreviation: PV)

The technique that allows transforming solar energy into electrical energy (current) via solar cells.

Photovoltaic generator

A complete system that ensures the production and management of the electricity provided by the PV modules. The energy is stored in batteries and/or converted into AC according to the type of application.

Photovoltaic module

Interconnected (in series or in parallel) photovoltaic cells that are usually mounted in a sealed unit with a practical dimension for easy shipment, handling and assembly in module fields. Synonym of " photovoltaic panel ".

Photovoltaic module field

A set of interconnected photovoltaic modules that operate as a single electricity production unit. The modules are assembled on a common support or building. In case of a system with reduced dimensions, it can be a set of two modules on their support or building.

Photovoltaic principle

describes the formation of voltage in a semiconductor or in a pigment molecule, when light radiation excites the load sensor. Electrical energy in the form of current is obtained by extracting these load sensors. The photovoltaic principle was discovered by Becquerel.

Poly or multicrystalline silicon (mc-Si ou poly-Si)

Form of crystalline silicon composed of several silicon crystals. It is composed of small interconnected crystals with a size that ranges from a few millimetres to several centimetres. Its production is thus very simplified, compared to monocrystalline silicon. The conversion of a multicrystalline cell is between 10 and 15%.

Polycrystalline

When cooled, silicon solidifies, forming many crystals. This type of cell is also blue, but not homogeneous; the various crystals create a shimmering structure.

Power (W)

Amount of work (or energy) produced or consumed by a system per time unit. It is measured in Watts [W], corresponding to 1 Joule per second.

Power line communication

Term used to define the data transmission via the network line.

Power optimiser

See "MPP-Tracking".

PV

Abbreviation of " photovoltaic ", the term referring to the conversion of solar energy into electrical energy.

PV DC main cable

Cable connecting the PV generator junction box to the conversion equipment DC terminals.

PV generator junction box or panel array

Casing in which all the PV units are electrically connected or where protection devices can be placed.

PV laminate

PV module without frame, resulting from encapsulation. It presents itself with a glass-glass, glass PVF or insulating glass sandwich structure

PV panel, module or component

A set of PV cells connected via grids and contacts, encapsulated and operating as a single system within a PV installation.

PV string cable

Cable connecting the PV strings to the generator or the PV unit junction box.

PV system

A system composed of photovoltaic modules, cables, inverter(s) and meter(s) used for electrical energy production.

PV unit cable

Cable connecting the PV unit junction boxes to the PV generator junction box.

PVB

Abbreviation of Polyvinyl butyral. This plastic resin is used for the encapsulation of the PV cells by lamination.

PVF

Abbreviation of Polyvinyl fluoride. This plastic resin is used for the encapsulation of the PV cells by lamination. Tedlar® is the commercial name for PVF.

R

Rear ventilation

By ventilating the rear of the panel, its temperature remains minimum and its energy-efficiency optimal

Reflection losses

The light reflecting on the cell surface cannot be transformed into energy. An Anti-reflex layer prevents this phenomenon.

Restrictive clause

Special easement to ensure access to solar radiation in case of solar or wind system. See also "Easement"

S

Series connection

Method for interconnecting electricity-producing or electricity-consuming devices, according to which, the device voltage increases while the current remains constant. Opposite of "parallel connection"

Shadowing

Obstacle to direct radiation projecting a shadow on all or part of the cells, modules, strings or PV installations. Shadows are divided in the so-called core shadows, distant enough to almost instantly project the shadow on the entire installation (horizon effect), and half shadows, which project partial shadows. The latter are to be avoided, since they cause power losses in installations and modules that are much higher than the shadowed surface. In case of a system with an inverter per string, it is advisable to cable the strings in parallel to the largest shadow: For example, if a tree is projected on a PV system during the day, the strings must be cabled vertically.

Short-circuit current: I_{sc} (std)

Short-circuit current of a module, string or PV unit in standard test conditions. The current flowing freely through an external circuit that has no load or resistance; the maximum current possible. See also "Cell features".

Silicon

Symbol: Si. Chemical element of the family of the Cristalloïdes. The most abundant element on earth after oxygen. It does not exist in the free state, but only in the form of compounds (dioxide, silicon in the sand, quartz, etc.) or of silicates. Chemical element that can have four combinations with neighbouring atoms. Silicon is the semiconductor that plays the most important role in the semiconductor and photovoltaic industries. This raw material which is silicon dioxide (sand!) can be processed into monocrystalline, polycrystalline or amorphous silicon.

Solar diagram

representation in rectangular coordinates of the path of the sun in the sky. The used coordinates are the solar height and azimuth, which univocally define the position of the sun in a certain moment. By representing the solar phases of different days of the year on the same diagram, it is possible to obtain a description of the sunlight in a certain place over the year.

Solar energy

The energy derived from the sunlight or solar radiation (heat or UV radiation)

Solar or photovoltaic cell

Electronic component providing electrical energy when exposed to solar radiation. In case the electrical voltage of a single solar cell is too low (0,5 V env.), more solar cells are grouped together to form photovoltaic panels. The most common material currently used to make solar cells is silicon, which can be used after various treatments (monocrystalline, polycrystalline, amorphous silica). Moreover, in many technical variants aiming at an increased energy-efficiency, innovative materials are being tested (cadmium telluride, indium cadmium sulfide, titanium dioxide and many more).

Standard test conditions

Test conditions provided by EN 60904-3 for PV cells and modules

Standard Test Conditions, (STC)

Measurement of the maximum nominal power of a solar panel with AM = 1.5 times the solar spectrum, a cell temperature of 25°C and a solar radiation of 1000 W/m².

String

A string is composed of any number of cells, modules or panels connected in series in order to obtain a certain voltage

String

See "String".

String inverter

This type of inverter allows preventing inconveniences to the centralised inverter. The PV generator is divided in different strings, each coupled to the external network via single string inverters. This way, installation results much easier and the reduction of energy-efficiency due to manufacture dispersions or to shadows on the solar panels, are greatly limited

Subsidies, allowances

Financial services provided by law in order to promote PV through the repurchase of the produced electrical energy at a higher price than that on the market, an aid to offset the cost of installation or a tax discount.

T

Telemetry

Remote measurement of a physical quantity with instruments that convert this measurement in a transmissible signal.

Thin film cell

Second generation cells based on a very thin film of semiconductor material. This type of cell is characterised by a lower production cost. Various semiconductor materials may be used for this technology: Amorphous and micromorphe silicon, CdTe (Cadmium telluride), CIS (Copper Indium Selenium), etc.

Thin layer solar cell

Name for thin solar cells. The manufacturing process does not require the wafer (crystalline silicon). This process can be carried out using considerably less power.

Tilt

Angle characterising the module tilt over the horizon, positively measured from the horizontal plane upwards. A PV panel placed horizontally has a zero tilt.

Transparent, semi-transparent, partially transparent

Feature of a PV module defining the quantity of light that crosses it. The module is supplied with a degree of transparency: if its equal to 0, the module is opaque. The energy-efficiency of a semi-transparent module is always lower than that of an opaque module with the same technology and service.

The visual aspect varies considerably according to the production method:

- 1) On a glass substrate, deposit a film of active material thin enough to allow obtaining a homogeneous degree of transparency. This type of photovoltaic module is ideal for sites where a contrasting shadowing is not advisable, such as offices, schools, etc.
- 2) Etch transparent zones on the (opaque) crystalline silicon substrate by material withdrawal following the size of the etched pattern. The module can appear with a different degree of transparency.

3) When laminating, the space between mono- or multicrystalline cells can be modified, thus allowing to choose the degree of transparency.

The minimum degree of transparency, or the amount of light crossing the module, corresponds to approximately 10%. This value is given by the minimum space of 2 mm between cells. Starting from the degree of transparency, an optimal ratio is chosen between transparency and energy production.

W

Wafer

A thin sheet of semiconductor material . The wafer is the main component for the production of computer chips and solar cells. The slices are generally cut in semiconductor blocks and have a thickness from 0.2 to 0,3 mm.

Watt hour (Wh - kilo-, Mega-, Giga-)

Amount of energy corresponding to 1W in one hour, i.e., 3'600 Joules. A kilowatthour [kWh] corresponds to 1000 Wh, 1 megawatthour [MWh] to 1000000 Wh and 1 gigawatthour [GWh] to 1000000000 Wh.

Watt Peak

The power released by a photovoltaic module under an optimal sunlight from 1 kW/m² to 25°C (Performances are function of temperatures).

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